ADVANCED PARTICIPATION AMONG HISPANIC STUDENTS

by

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Dedication

For my mother and father, Raquel and Roberto Soto, who have always shown me that anything is possible through hard work and dedication. For my brother, Robert, nad my sister, Klaudia, thank you for always being amazing role models and inspirations for your little sister. For my husband, Richard, receiving this degree would never have been possible without you, thank you for being my rock. For my son, Michael, you are my world, and for my baby girl, you have been with me for the last nine months of this program, and I cannot wait to meet you. For my teachers and professors who have given me the confidence to pursue my dreams.

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Abstract

Background: The foundation of academic preparation begins early in a student's life. Student instruction throughout the K-12 years can help prepare students for success in either post-secondary education or their career. As our lives become more dependent on areas that comprise science, technology, engineering, and mathematics (STEM), youth must develop the necessary skills to meet this demand. Although there are opportunities for all students to participate in Advanced Placement (AP) courses, there is a lack of Hispanic student representation. **Purpose**: The purpose of this study was to identify factors that affect Hispanic student's AP enrollment, including socioeconomic status and status as an English language learner. The goal of the study was to analyze Hispanic students' participation and performance in AP courses utilizing existing district data. Identifying the factors that affect Hispanic English learners (ELs), including their low-socioeconomic status, will help schools understand the dynamics that influence AP decisions. This information can be used to encourage enrollment of Hispanic students by improving the preparation for the AP classes and increase the state and national representation of Hispanics in STEM careers. **Method**: Masked data from a school district in a large urban area was gathered to answer the research questions. The data were analyzed using a Chi-Square test to calculate the difference in student enrollment among ethnicities in Pre-AP, AP, and Dual Credit courses. A Chi-Square test was run to determine if there was a significant difference between Hispanic Economically Disadvantaged and Non-Economically Disadvantaged students' enrollment in AP STEM, AP Spanish, and AP. A Chi-Square test was run to analyze differences between Hispanic

English Learners and Non-English learners' participation in AP STEM, AP Spanish, and participation in any AP course. **Results:** Hispanic students had a lower participation rate in all courses compared to non-Hispanic students. Of the total Pre-AP, only participants (*n*=2605), thirty-nine percent (*n*=1029) were Hispanic versus sixty percent Non-Hispanic (*n*=1576). The total number of students participating in general AP was 757, with thirty-four percent identified as Hispanic students (*n*=258). Dual Credit courses had a total of 582 students, of which forty percent were Hispanic students (*n*=234). The only discernible difference was the rate at which students identified as Hispanic English Learners enrolled in AP Spanish only (*n*=15) courses (an increase of nine percent). Finally, slightly over half (52%) of the Hispanic non-ELs (*n*=2608) were not enrolled in any AP courses. **Conclusion:** Overall, the data indicate the students identified as both Hispanic and low social-economic status have a lower enrollment rate in any AP course, including Dual Credit. The study found that Hispanic students who are not economically disadvantaged enroll in more AP courses that are not limited to AP STEM and AP Spanish. The study also found that Hispanic Non-English Learners enroll in more AP courses than English Learners. Addressing the barriers that Hispanic students encounter when enrolling in college readiness courses can help improve Hispanic student participation in advanced preparation courses and STEM-related fields.

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Chapter I

Advanced Participation Among Hispanic Students

The foundation of academic preparation begins early in a student's life. Adequate educational instruction throughout the K–12 academic years prepares students for success in higher education. Student participation in advanced courses can help students develop the necessary academic training to succeed in science, technology, engineering, and mathematics (STEM). Day by day, our lives are becoming more dependent on the areas that comprise STEM. This growing dependency on STEM will increase the need for STEM professionals to meet the demand. Our youth must develop the necessary skills to succeed in STEM careers. Advanced preparation in math and science courses offers students exposure to academic rigor, which will prepare them for college courses (Klopfenstein, 2014; Roach, 2018).

Students can improve their opportunities to perform well both in high school and higher education courses by participating in Dual Credit (DC), Pre-Advanced Placement (Pre-AP), or Advanced Placement (AP) courses (Hinojosa, Robles-Pina, & Edmonson, 2009; Klopfenstein, 2014; Roach, 2018). An estimated 70% of high school graduates enroll in postsecondary education, but less than half of the students who enroll in higher education courses earn a degree (Ndura, Robinson, & Ochs, 2003).

In the United States, 11th-grade students can also receive college credit while in high school by enrolling in Dual Credit courses. The Dual Credit option prepares high school students for secondary education courses by allowing them to enroll in college courses at a community college. The limitations presented to many students who decide

to enroll in Dual Credit are that not all Dual Credit courses will transfer to all universities. The Dual Credit program does not necessarily align with the requirements of the high school's state curriculum. Thus, it is up to the discretion of each school district to decide if the Dual Credit courses meet the state's requirements (Lonestar College, 2019). Therefore, colleges and universities may not accept these courses upon enrollment. However, AP courses are and can be used to lessen the number of courses required in the University degree plan. AP courses offer students more course choices to transfer to colleges and universities based on their performance on AP exams.

Since the initiation of the AP program in 1955, high school students have the opportunity to receive college credit for participation and performance in AP classes. The College Board's AP program allows high school students to complete college-level courses and earn college credit by exam. The College Board is a not-for-profit organization that is governed by an elected Board of Trustees that are further guided by three national and six regional assemblies (College Board, 2017). The College Board administrates the AP program and the alignment of college coursework with AP courses. According to the College Board (2018), there are currently eleven Pre-AP courses and 38 AP courses offered to students. The Pre-AP courses include STEM, History, and Art courses and are offered in both middle school as well as the first two years of high school. In high school, Pre-AP courses add weight to the student's GPA, but it does not translate into a course that is accepted at a university. However, successful AP course completion results in a weighted GPA in which students receive an extra point in their grade point average (GPA) at the end of each semester. Thus a student who earns an "A"

in an AP course with a weight of 5.0 instead of a 4.0. Students also have an opportunity to receive college credit by scoring three or above on an AP exam. According to the College Board (2018), there are 27 different AP exams offered to students. The exams include U.S. History, English Literature and Composition, Calculus, U.S. Government and Politics, Biology, Spanish Literature, Statistics, and Chemistry. Each AP exam is scored using a grade point scale: 5 (*extremely well qualified*); 4 (*well qualified*); 3 (*qualified*); 2 (*possibly qualified*); and 1 (*no recommendation*). The AP exams are designed to asses students' knowledge of the content AP courses.

There is a cost-benefit to students earning a three or better on the AP exam – college credit. By receiving college credit, students who score well on the AP exam can reduce the number of basic and remedial college courses, which in turn decreases the cost of college. With a minimal average cost of $26,000 per year for in-state tuition and $51,000 for private college tuition, passing an AP exam can reduce the time in college, and thus reducing the cost of college. Despite the array of AP courses offered in the United States, many students do not partake in the opportunities for college credit through AP enrollment.

Student participation in AP courses can align with their academic performance in both high school and higher education settings (Hinojosa et al., 2009; Klopfenstein, 2004). Students who excel in AP courses will perform well on AP exams. However, receiving passing scores on AP exams and having a higher weighted GPA is not the only indication that students are prepared for college. Research suggests that AP courses impact a student's college admission scores, acceptance, and early college success

(Klopfenstein, 2004; Klopfenstein & Thomas, 2009; Murphy & Dodd, 2009; Warne, Larsen, Anderson, & Odasso, 2015). For example, in some cases, students who fail the AP exams succeed in college-level courses because of the advanced coursework and rigor received in AP classes. A large majority of students who participate in AP courses but do not take AP exams also succeed in college (Mason, 2010). Participation in AP courses is regarded as one of the best predictors for academic progress and future achievement (Hinojosa et al., 2009; Keng & Dodd, 2008; Murphy & Dodd, 2009; Theokas & Saaris, 2013; Walker & Pearsall, 2012; Witenko, Mireles-Rios, & Rios, 2016).

High school students have opportunities to enroll in AP courses offered at their campuses and districts and receive support through national, state, and local agencies. For example, the Department of Education's Office for Civil Rights (Theokas & Saaris, 2013) provides incentives to promote AP enrollment alongside initiatives such as the White House Initiative on Educational Excellence for Hispanics (U.S. Department of Education, 1990). Several private organizations, including Google and Microsoft, have contributed to the enhancement of AP coursework to increase STEM readiness (Cabrera, Deil-Amen, Radhika Prabhu, Terenzini, Lee, & Franklin, 2006).

The College Board provides support to award all students equal opportunities to engage in higher education aligned with college rigor. The College Board (2013) *Report to the Nation* states that AP coursework is available to all students regardless of their location, background, or socioeconomic status. Students who participate in AP courses have been identified to have AP potential based on their performance on the PSAT/SAT test. Students' PSAT/SAT performance provides teachers indicators that will help predict

how well a student will succeed in an AP course and identify in which course they will succeed. Based on the PSAT/SAT scores, researchers can identify 60 percent of a possible AP student's success in AP subjects. However, thousands of students who qualify and meet the criteria did not participate in AP courses. Their socio-economic and ethnic backgrounds may influence students' lack of participation in AP courses. Many schools also use a student's GPA or a grade in a prerequisite course to determine their potential admission to an AP course. The College Board (2018) describes that the only indicators available to forecast student success in AP courses are limited to their performance on PSAT/SAT scores and GPA. Due to the limitation of AP predictors, many students who can participate and be eligible to participate in AP courses do not (College Board, 2012).

In an analysis of the graduating students from the class of 2013, of the 3 million total AP exams available, 1.3 million had a passing score. What the College Board took note of was that even with these numbers, there were approximately 300,000 students who could have taken the exams but chose not to take the exam and therefore did not enroll in the AP courses (College Board, 2014). In most subject areas, African American/African American, Hispanic/Latino, and American Indian/Alaska Native students who are identified to have potential in succeeding in AP courses are less likely to participate (College Board, 2012). In an example provided by the College Board (2012), out of the students who were identified as having AP potential in mathematics, six out of 10 Asian/Asian American/ Pacific Islander students will take that course, compared to four in 10 Caucasian students, three in 10 Hispanic/Latino students, three in

10 Black/African American students and two in 10 American Indian/Alaskan Native students. Although students receive opportunities to participate in AP courses and have educational support through incentives offered by the College Board, there is still a lack of representation of qualified Hispanic, African American, and American Indian/Alaskan Native students completing AP courses and receiving AP credit.

Given the research on student AP indicators, teachers play a critical role as gatekeepers of which students obtain entry into AP courses. Student AP enrollment may improve with the collaboration of teachers and counselors. In a recent study, the impact of school counselors was highlighted (Ohrt, Lambie, & Leva, 2009). The study described how a program implemented by professional school counselors (PSCs) was used to help improve college readiness for Hispanic and African American students (Ohrt, Lambie, & Leva, 2009). The PSC's analyzed AP data from the College Board and developed a program to identify, track, prepare, and support qualified Latino and African American students for the AP curriculum (Ohrt et al., 2009). Students were selected based on their performance on the P/SAT test but also were identified based on previous coursework, grades, and teacher recommendation to avoid testing biases. Results showed that teachers played a critical role as gatekeepers identifying students with AP potential that was not limited to their SAT performance. A teacher's recommendation of potential AP students was based on their individual in class performance.

Garland and Rapaport (2017) reported 52% of Caucasian students completed at least three AP courses while in high school as compared to 41% of Hispanic students and 39% of African American students. So, while advanced courses are available in high

schools, and all students have equal access to AP courses, Hispanic and African American students continue to be underrepresented in AP enrollment (Garland & Rapaport, 2017; see also Edwards & Sawtel, 2013). Research suggests there are social, economic, and cultural factors that promote and discourage AP enrollment of Hispanic students across all academic levels (Witenko et al., 2016; Walker & Pearsall, 2012; Engberg & Wolniak, 2010; Klopfenstein, 2004).

Social Factors

Hispanic students' social background can affect their educational perspectives and motivation in enrolling in AP courses and other college preparatory programs. Educational preparation does not equate with the educational opportunity, but at times, is mirrored by the student's social background (Rivas-Drake, 2008). The definition of first-generation students is the first in their family to receive a degree in higher education. However, this study uses the term *first-generation student* to refer to students who are first in their immediate families to attend public schools in the United States. The definition is based on the statistic that more than half of the foreign-born students who are attending school in the United States for the first time are from Latin America (NCES, 2012).

Students and parents who are foreign-born arrive in the United States with different educational foundations, and the adjustment to U.S. public schools can create barriers for Hispanic students. Desmond and Turley (2009) refer to familism to describe the impact of a family's social patterns, individual interests, and decisions based on their relatives' perspective rather than their own. In many cases, Hispanic parents expect their

children to contribute to supporting the family when they reach a certain age as well as to continue their parent's social pattern. Given the financial responsibilities to help support their family, many Hispanic students do not consider AP courses and college preparatory classes or enrolling in higher education. Familism plays an important role in Hispanic students' approach and perceptions of higher education (Desmond & Turley, 2009). Pursuing a degree in higher education is not considered the "norm" in some Hispanic families whereas providing financial support is considered a norm. A Hispanic student who decides to pursue higher education and is the first in the family to attend college at times will not receive support from his/her family (Engberg & Wolniak, 2010).

Additionally, their parents' lack of higher education can contribute to the lack of knowledge about AP courses and college preparatory classes. Many Hispanic students' parents are not aware of the benefits associated with AP classes and create a barrier to their children's higher education success (Rivas-Drake, 2008). Other studies, such as Ndura et al. (2003) reported that parents had the greatest influence on students' motivation for AP enrollment.

The effects of familism and the struggle of self-identity for Hispanic students can also affect student participation in AP courses. First-generation students struggle with self-identity and find it challenging when compared to their family members who did not receive higher education or attend U.S. schools. Consequently, first-generation Hispanic students encounter social barriers that impact their educational experiences and motivation. Moreover, those experiences in the high school context can, in turn, affect students' post-secondary success. In their 2009 study, Engberg and Wolniak found that

students' acquisition of human, social, and cultural capital while in high school and at the individual level affects their attendance at two- and four-year colleges. The study describes the relationship between student high school courses and college attendance (Engberg & Wolniak, 2010).

First and second-generation students (i.e., students whose parents received an education in the U.S.) also can be impacted by the social factors they encounter while attending high school, such as economic factors. Economic disparities among the student population can also contribute to the disparities among Hispanic students' AP enrollment. For example, in the College Board 2014 AP Report to the Nation, 11,191 students of low-income status took at least one AP exam in 2003, that number increased to 50,584 in 2013. The College Report also reported that 14,380 Hispanic students took at least 1 AP test after graduating high school in 2003. This number increased to 433,031 Hispanic students taking at least 1 AP exam in 2013. Even though both economically disadvantaged and Hispanic student participation in AP courses is increasing, this study aims to identify if there is a relationship between Hispanic students' socioeconomic status and AP enrollment at a school district in a large suburban school in the southwest.

Economic Factors

Previous research has identified that there is a relationship between students of low socioeconomic status and their academic success. Overall, students who are of low-socioeconomic status have a lower college enrollment rate (Cabrera et al., 2006). The lack of preparation while in high school can establish academic barriers for students of low-socioeconomic status (Ndura et al., 2003). Preparatory programs, including AP

courses, are available to students, and participation in such programs offers numerous benefits. However, students from low-socioeconomic backgrounds may not be aware of these programs and their associated benefits because of their lack of participation in PSAT tests that indicate their AP potential (Edwards & Sawtel, 2013).

Given that Hispanic students represent a large majority of the low-socioeconomic students in high school, the Hispanic student population is at a distinct disadvantage (Ndura et al., 2003). One of the main reasons that students do not pursue higher education is a lack of adequate preparation for college-level courses (Ndura et al., 2003). Furthermore, there is a relationship between low-socioeconomic status and student participation in higher preparation courses (Cabrera et al., 2006). Due to the impact of cultural and socioeconomic factors, Hispanic students are considered to have unequal educational opportunities for advanced coursework (Ndura et al., 2003). Examining these contributing factors and the conditions underlying Hispanic student's advanced preparation is requisite to advancing the role of Hispanic students in STEM education and, thereby, STEM careers.

National Context

To provide higher quality education and rigor to all students receiving an education in the U.S. Former President Barack Obama signed the Every Student Succeeds Act (ESSA) in 2015. ESSA enhances the role of AP courses by allowing students to receive college credit by participating in AP courses and passing AP exams (Murphy & Dodd, 2009). Furthermore, there are guidelines to help students navigate the AP process. According to the Murphy & Dodd (2009), high school students have the

option to enroll in their choice of 37 AP courses, of which, seven are AP science courses, and five are AP math courses representing Math and Science of STEM. If an AP course is not offered at a student's campus, he or she has the option to take the course with an approved provider (Murphy & Dodd, 2009). Students who begin receiving AP instruction in the early stages of their schooling (i.e., starting in middle school) will acquire the necessary skills to balance studies and social life, which can potentially serve their academic growth. Studies have shown that students who take AP courses outperform their matched non-AP peers on most college outcome measures (Keng & Dodd, 2008; Murphy & Dodd, 2009). Students who enroll in advanced or AP classes can engage in higher-order thinking, evaluate problems, and develop critical thinking skills, all of which better prepare them for college courses (Garland & Rapaport, 2017). Although opportunities are provided to all students, the National Center for Education Statistics (2010) reports that only 9% of Hispanic students are represented nationally in AP courses. This lack of representation is troubling considering the U.S. Census Bureau's (2010) report on diversity, which lists the U.S. population at 308,745,538 with the ethnic breakdown as 61.3% Caucasian, 17.8% Hispanic, and 13.3% African American. Moreover, the Hispanic population is the fastest-growing population (16% in 2000 to 26% in 2016) in the U.S. Elementary and Secondary schools. (NCES, 2019).

State Context

House Bill 5. The state of Texas has addressed the need for STEM education through legislation, specifically House Bill 5 (HB5). Prior to HB5, students could choose between three different high school graduation programs: The Minimum High School

Program, the Recommended High School Program, and the Distinguished Achievement Program. HB5 replaced the three high school diploma choices with a single program, which was designed to help students take courses suitable for their career interests. The law requires students to complete 22 credits, including four credits in English language arts and three credits each in science, social studies, and mathematics (American Institute for Research, 2015).

Additionally, students must select one of five endorsements to pursue: arts and humanities, business and industry, public services, multidisciplinary studies, or STEM. Due to HB5, school districts in Texas have begun to implement incentives for students to graduate with a focus on STEM areas. High school students are given the choice of what educational avenue they would like to pursue their career interests. Students have a choice to enroll in courses that align with their future educational goals. HB5 allows all students the choice to take courses they find fit for their personal interests. In this case, students can enroll in AP courses in any subject as well as enroll in math and science AP courses specific to the STEM endorsement and receive college credit for any endorsement they choose. Students are given the choice of courses to take despite their economic, ethnic, and social background. Minority high school students, as well as those who are economically disadvantaged, have the opportunity to enroll in AP courses. From 2007-2013, the number of advanced courses offered in STEM areas increased to an average of nine courses per campus in Texas Public schools across all locales, including those with large or small proportions of economically disadvantaged students and with large percentages of minority students (Garland & Rapaport, 2017). There are

opportunities for Hispanic high school students to enroll in AP courses, but their enrollment is underrepresented both nationally and statewide (Ohrt et al., 2009). Opportunities have not diminished for Hispanic students as Garland and Rapaport (2017) reported that more AP courses were offered at schools identified as predominately African American and Hispanic (17 courses) than at predominately Caucasian schools (9 courses). This lack of diversity is also reflected in the workforce, with only 6% of STEM positions being held by Hispanic employees, according to the U.S. Census Bureau's 2009 American Community Survey (Beede, Julian, Langdon, McKittrick, Khan, & Doms, 2011).

Local Context

One school district that promotes diverse AP enrollment is located in the Southwest United States. According to the school district's website, students have access to a variety of rigorous coursework offered across different AP programs at all high school campuses. Students who are eligible to enroll are strongly encouraged to participate in the AP program through open enrollment. If a student is interested in joining an AP course that is not offered at his or her home campus, the student has alternative options to take the course. AP courses include access to challenging course work that can prepare students who are interested in pursuing four-year college degrees but also to those seeking two-year degrees.

Up-Skill Houston (2017) reports that 41% of all jobs in the Houston region are middle-skilled positions that require more than a high school education but less than a four-year undergraduate degree. A workforce development program, Up-Skill Houston,

aims to bridge the skills gap across the regional economy. Students who choose not to pursue a four-year degree can receive training for a two-year degree and then succeed in middle-skilled positions.

National, state, and local efforts, provide support to improve the representation of all ethnicities, including Hispanic students, in AP programs. Unfortunately, despite the national, state, and local efforts, ethnic disparities in AP enrollment, advanced preparation, and STEM careers still exist (Ohrt et al., 2009). Identifying the impact of Hispanic students' socioeconomic status and the relationship with AP enrollment and performance can help fill the gap of underrepresentation of Hispanic students in AP courses, college enrollment, and STEM-related careers. The conceptual framework of this study is based on a student's social and cultural capital. Various researchers have found the importance of social and cultural capital that reflects the school context (Cabrera et al., 2006).

Need for the Study

The College Board offers teachers resources to identify potential students who will succeed in AP courses, and these indicators are necessary so teachers can help improve AP enrollment of Hispanic students. However, according to the College Board, the only indicators that are offered for teachers to identify potential AP students are based on the data provided by a student's ACT or SAT score (College Board, 2019). If teachers are the gatekeepers to the entry into AP courses, then more individual data needs to be considered. Through the examination of the impact of socioeconomic status and language

status on AP enrollment, this study can help teachers improve AP enrollment with additional AP training on other types of performance indicators.

Purpose of the Study

The purpose of the study is to identify the factors that impact Hispanic student enrollment in higher preparation courses such as Pre-AP, AP, and Dual Credit, including socioeconomic status and English Learner (EL) status. The identification of the barriers Hispanic students face regarding AP enrollment and how their barriers impact enrollment may help in understanding the relationship between AP enrollment and STEM preparation. ELs who are new to the U.S. may run into challenges in preparing for higher education courses because of their language barrier.

Previous research has found that Hispanic students (24%) are less likely to attend college than Caucasian students (41%) (Cates & Schoeffle, 2011). Also, Edwards and Sawtell (2013) found that Hispanic students who are EL and enroll in AP courses only enroll in AP Spanish. Thus, this study builds on previous research on the impact of socioeconomic status and language status on Hispanic student AP enrollment.

Research Questions

1. What if any, is the enrollment difference between Hispanic and Non-Hispanic students enrolled in Pre-AP, AP, and Dual Credit Courses?
2. What, if any, is the relationship between Hispanic students' socioeconomic status and the type of AP courses students enroll in geared explicitly towards AP

Science, Technology, Engineering, and Mathematics (STEM), AP Spanish, or AP Other?

3. What, if any, is the relationship between Hispanic students' language status impact on Hispanic students' enrollment in AP and whether or not SES status influences this relationship?

Chapter II

Literature Review

With the increasing demand for Science, Technology, Engineering, and Math (STEM) careers, it is critical that the STEM workforce in the U.S. grow in order to maintain its role in global leadership. Developing STEM programs in early education is the starting place for achieving growth in the STEM workforce, and the k-12 educational settings have increased the STEM focus since 2011 (U.S. Department of Education, 2014). The United States Office of Innovation and Improvement aims to maximize access to high-quality STEM education for all students. The Every Student Succeeds Act (ESSA) requires that all teachers in the U.S. use high academic standards to prepare students to succeed in either college or career (U.S. Department of Education, 2015). To provide high-quality STEM education finding the relationship between STEM preparation and Advanced Placement (AP) courses is imperative. AP courses offer challenging coursework to students and promote their academic development to succeed in STEM-related fields. The composition of college readiness for any career pathway, not limited to STEM, begins by observing the participation of high school students in college preparation courses such as Pre-AP, Dual Credit, and AP classes. Students of all ethnic backgrounds deserve the opportunity to increase their academic opportunities by participating in college preparation courses. This study focuses on the key factors that impact Hispanic students in their educational pathways and provides perspectives to address the underrepresentation of Hispanics in AP and STEM.

Dual Credit

College Readiness refers to the "level of preparation a student needs in order to enroll and succeed, without remediation, in a credit-bearing general education course" (Conley, 2008, p. 4). Eleventh-grade students can receive college credit while in high school by enrolling in Dual Credit courses with a community college. Like Pre-AP, the Dual Credit courses do not imply a financial benefit to students who want to attend a 4-year university as not all Dual Credit courses will transfer to all universities. One reason is that Dual Credit courses do not align with the high school state curriculum required by the state, thereby leaving it to the discretion of the district to decide if the Dual Credit courses meet the state requirements (Lonestar College, 2019). Due to this limitation, it seems reasonable that students select the Pre-AP and AP route for college preparation. Students who are interested in preparing for AP courses have the option to enroll in Pre-AP courses beginning in middle school.

Advanced Placement

The Ford Foundation intended to improve American schools by creating the Fund for Advancement of Education (FAE) in 1951. Nugent and Karnes (2002) describe the role of the FAE program for early admission to college for high school seniors. At this time, Ivy League schools, such as Harvard, Princeton, and Yale, along with preparatory schools affiliated with Ivy League schools, allowed high school seniors to take college-level courses (Mason, 2010). The purpose of the advanced course reflected the rigorous and challenging coursework students encountered in higher-level education. The AP program was first implemented in 1955-1955 and was only offered to students who

attended elite high schools or prep schools (College Board, 2017). Since then, the focus of AP courses has changed significantly. According to the College Board yearly report, the first year the AP Program was implemented in 1955-1956: 104 schools, 1,229 students, and 130 colleges participated. As of 2018, there are 22,612 schools, 2,808,990 students and 4,287 colleges participating in the AP program (see Table 1) (College Board, 2018).

Table 1

National AP Courses Offered Since 1955

Year	Schools	Students	Colleges
1955-56	104	1,229	130
2009	17,374	1,691,905	3,809
2010	17,861	1,845,006	3,855
2011	18,340	1,973,545	4,001
2012	18,647	2,099,948	4,005
2013	18,920	2,218,578	4,027
2014	19,493	2,342,528	4,121
2015	21,594	2,483,452	4,154
2016	21,953	2,611,172	4,199
2017	22,169	2,2741,426	4,221
2018	22,612	2,808,990	4,287

Note. Data adapted from the College Board (2013)

The growth of the AP program is reflected by the number of schools and students participating in the AP program. Student AP exam participation is also increasing. Mason (2010) reports that in 2008, at the national level, 15.2% of students who graduated

from public schools took the AP exam passed with a score of three out of five. Some students also received college credit by taking and passing one or more AP exams. As of 2018, the College Board (2018) reports the participation of more than 4,000 colleges and universities in the United States grant students college credit or college course placement based on the student's performance on AP exams (College Board, 2018). If an AP course is not offered at a student's campus, he or she has the option to take the course with an approved provider (Murphy & Dodd, 2009). Table 2 shows courses currently offered to students according to the College Board (2018).

Table 2
Advanced Placement Courses Currently Offered by the College Board

AP STEM COURSES	AP NON-STEM COURSES
Biology	Chinese Language & Culture
Calculus AB	Latin
Calculus BC	Music Theory
Chemistry	Psychology
Computer Science	Research
Computer Science Principles	English Language & Composition
Economics: Macro	French Language and Culture
Physics C: Electives and Magnet	German Language and Culture
Physics C: Mechanics	Government and Politics
Environmental Science	Italian Language & Culture
Human Geography	Japanese Language and Culture
Statistics	Spanish Language and Culture
Economics: Micro	Spanish Literature

The growth of the AP programs can be attributed to the importance of advanced preparation and college success based on AP participation. College readiness is supported by the Every Student Succeeds Act to improve advanced participation and

college preparation (ESSA, 2015). Students who begin receiving early AP instruction will acquire the necessary skills to balance studies and social life, which can improve their academic growth and college readiness. Studies have shown that students who take AP courses outperform their matched non-AP peers on most college outcome measures (Keng & Dodd, 2008; Murphy & Dodd, 2009). Students who enroll in AP classes can engage in higher-order thinking content, they learn how to evaluate problems, and to develop critical thinking skills, all of which will better prepare them for college courses (Garland & Rapaport, 2017).

Pre-AP. As a point of entry, the College Board has certified eleven Pre-AP courses (Table 3). The Pre-AP courses provide students with the opportunity to build a skill set required for future success. The Pre-AP courses are offered in middle school and within the first two years of high school. The options for when the courses are offered vary by the school district. Unlike the AP courses, Pre-AP courses do not provide an option for college credit, nor do they provide an option for course placement. Therefore, unlike the AP courses, students who take these courses do not see a financial benefit at the college level (i.e., a reduction in the cost of the tuition or time to degree completion). It is also important to note that students do not have to take Pre-AP courses to be eligible for AP courses.

Table 3

Pre-Advanced Placement Courses offered by the College Board

Courses	
English 1	English 2
Algebra 1	Geometry with Statistics
Biology	Chemistry
World History and Geography	Arts

A variety of AP courses offered by the College Board are parallel with STEM courses that can help increase student's preparation for college and STEM readiness. The College Board offers additional resources to increase student's participation in Pre-AP and AP courses. One of the programs provided by the College Board is the SAT–PSAT/NMSQT program that provides indicators to help identify academic areas of strength for students (Murphy & Dodd, 2009). Students who participate in taking the SAT-PSAT/NMQT exams receive reports that parallel with Pre-AP or AP course/s in which they are likely to succeed.

Fees Associated with AP Courses. Students of all ethnic backgrounds have opportunities to enroll in AP courses. Previous research shows that although students take AP courses, they do not take the related AP exam, or they do not pass (Mason, 2010; Murphy & Dodd, 2009). According to Klopfenstein (2004), one of the reasons students may not take the AP exam is because they cannot afford to pay for the exam. The College Board sets the Exam Fee Rate, which was $94 in the 2019-2020 academic year, but

allows schools to increase the rate to cover administrative costs. Table 4 provides an overview of fees based on the school district's rates during the 2019-2020 academic year.

Table 4

Advanced Placement Exam Fee Chart

	2019-2020
AP Exam Fee	$94
School rebate (waived for low-income students)	$9
College Board Fee Reduction	$32
Texas Fee Reduction	$28
Federal Fee Reduction	$10
Amount paid by Low-Income Students	$16

Federal grants are available to help increase the AP participation rates of students who are of low socioeconomic status. All students of low socioeconomic status who are interested in taking AP exams can receive financial support for the exams under the Title IV, Part A Student Support and Academic Enrichment Grants program (College Board, 2019). As part of the Title IV, Part A block grant, districts can allocate the funds to subsidize the fees for their low-income students. Each state can reserve up to 5% of the funds and use them to subsidize the AP exam fees for low-income students (College Board, 2019). Additionally, individual campuses at each school district can allocate funds and provide students who do not qualify for free and reduced lunch with opportunities for

campus-based scholarships. Students have to apply for campus-based scholarships, but the opportunities for additional funding is available to take AP exams.

Although opportunities are provided to most students, the National Center for Education Statistics (2010) reports that only 9% of Hispanic students are represented nationally in AP courses. According to the U.S. Census Bureau (2010), the U.S. population is 308,745,538, of which 61.3% is Caucasian, 17.8% is Hispanic, and 13.3% is African American. The Hispanic population is the fastest-growing population (Rojas & Iglesias, 2013; see also, Pastor, 2013). High school students' decisions to enroll in college can be aligned with academic success in high school courses. Many students who enroll in high school AP courses and succeed in AP courses succeed in their college careers. Students who enroll in AP courses to improve their college readiness are generally prepared to attend college. Unfortunately, students of specific ethnic backgrounds such as Hispanic students do not enroll in the college preparation courses, which leads to a discrepancy among Hispanic students' college readiness compared to other ethnic groups (Witenko et al., 2016).

College readiness among Hispanics. The college-ready graduation rates of the students of 1,099 high schools in Texas were analyzed in a study conducted by Moore et al. (2010). The study analyzed students' scores in reading and math and found that one-third of students were considered to be college-ready based on the two subjects. Relevant ethnic differences were found among Hispanic, African American, and Caucasian students' college readiness. Examining the college readiness courses offered to Hispanic high school students, such as advanced placement courses, will identify the factors that

contribute to students' AP participation. Cook et al. (2012) present information on the college-going rates for Hispanics and the interventions of high school counselors that affect Hispanic college enrollment. The study describes that parents who were better informed about the benefits of AP courses related to the positive outcomes of AP enrollment for students of low-socioeconomic status.

Hispanic students of low socioeconomic status are at times placed in remedial courses that do not allow the opportunity for potential advanced coursework. Although students from low socioeconomic backgrounds may lag in specific subject areas, they can excel in other areas. Students who lack reading skills will be placed in reading resource classes but may excel in mathematics. Due to the placement of the remedial reading course a student loses the opportunity to enroll in a higher-level math course. Thus, a student who could qualify for AP Math courses may be automatically eliminated for consideration by the gatekeeper gave the remedial status in reading. This conflict becomes pronounced when noting that the AP Calculus class requires students to attend the 90-minute class daily. Students who are in remedial reading may not have room on their schedule for the calculus course (Moore et al., 2010).

Gatekeeper as Mentor. In some cases, students may not be aware of the opportunities to enroll in AP courses. High school students may not be informed about AP courses, which may be one reason why there is a lack of Hispanic representation in AP courses. High school counselors can provide all students with information about the benefits of enrolling in AP courses and help remove any barriers that Hispanic students encounter in enrolling in them (Cook, Pérusse, & Rojas, 2012; Ohrt et al., 2009). The

impact of school counselors is described in a study by Ohrt et al. (2009) whereby a program was implemented by professional school counselors (PSCs) to help improve college readiness for Hispanic and African American students. The PSC analyzed AP data from the College Board and developed a program to identify, track, prepare, and support qualified Latino and African American students for the AP curriculum (Ohrt et al., 2009). Students were selected based on their performance on the Pre-SAT test but also were identified based on previous coursework, grades, and teacher recommendation to avoid testing biases. The PSCs identified students who would potentially succeed in AP courses and met with them to explain the benefits and process of enrolling in AP courses. The counselors in this study also explained the college benefits for students who enroll in AP courses and provided additional support throughout the school year to students who decided to enroll in AP courses. Through the counselor support program, students were also paired up with mentors to help guide them through the challenge student might have had through the process of taking AP courses. According to Ohrt et al. (2009), 16 out of the 19 students who participated in the counselor program enrolled in a total of 25 AP courses and completed 25 AP exams with scores ranging from 1-5.

Teachers, as well as counselors, also play a critical role in improving Hispanic student AP participation (Mason, 2010). Mason (2010) found that 90% of teachers reported that it was part of their role to promote AP courses to students. The majority of the teachers wanted to encourage students to participate in AP courses, but only 56% felt that they were promoting AP courses to Hispanic and African American students (Mason, 2010). Many teachers reported promoting AP courses to the same students who had

achieved academic success in other AP or honor courses. Consequently, students who did not fall in the same category of "AP" potential were not encouraged to participate. AP promotion and encouragement varies from districts and campuses. Despite the effect that teachers and counselors have on AP enrollment, there are also national state and local incentives to promote AP student participation.

There has been a dramatic growth in the promotion of educational attainment. National, state and local incentives are being provided to students to encourage academic success (Tierney & Sablan, 2014). According to the U.S. Department of Education, high school graduation rates are at all-time highs, dropout rates are at all-time lows, and more students are enrolling in colleges. In a study conducted by Engberg and Wolniak (2010), two out of every three high school students enroll in a higher education institution. Therefore, the increase of AP courses should reflect the diverse participation of students, but unfortunately, it does not. According to the College Board (2013), "all students who are academically ready for the rigor of AP-no matter their location, background, or socioeconomic status have the right to fulfill that potential." The College Board (2013) also illustrates that Black/African, Hispanic/Latino, and American Indian/Alaska Native students who have the same AP opportunities are less likely to experience AP coursework. Klopfenstein (2004) describes how African American and Hispanic students enroll in AP courses at half the rate of Caucasian students.

At-risk students and dropouts. On the other end of advanced preparation to improve college readiness for Hispanic students is the connection between Hispanic students and the high school dropout rate, including at-risk students. Previous studies

suggest that the Hispanic population continues to rise as does the high school dropout rate among the Hispanic community (Cook et al., 2012; Cates & Shaefle, 2011; Yoshikawa, Gassman-Pines, Morris, Genettian, & Godfrey, 2010; Sheng, Sheng, & Anderson, 2011; Kim, 2013). The NCEIS (2017) reported the dropout rates by ethnicity, the highest dropout rates by ethnicities were American Indian/Alaska Native youth had the highest status of dropout rates of 10.1%, followed by 8.2% for Hispanics. The American Indian/Alaskan dropout rate is higher than the Hispanic dropout rate. However, Hispanics represent a more large portion of the population (NCEIS, 2017) and, therefore, the magnitude is higher for Hispanic students. High school students who drop out are also identified as students at risk (Cabrera et al., 2009). At-risk students, as defined by the Education Reform (2013), are students who are considered to have a higher probability of failing academically and dropping out of school.

Link Between Dropout and AP. In a study conducted by Cates and Shaefle (2011), the authors identified the relationship between college preparation programs and at-risk student's college readiness. At-risk students are considered students who have a high risk of not meeting the academic requirements necessary to earn a high school diploma (Cates & Shaefle, 2011). Cates and Shaefle (2011) provide valuable insight to conclude that there are differentiating factors between students enrolled in college preparation programs and at-risk students. The identification of at-risk students' and the factors of academic readiness was evaluated in a study by Yoshikawa et al. (2010). The authors provide racial and ethnic differences in how welfare policies affect relating students' current academic readiness and their future educational achievement.

Yoshikawa et al. (2010) value the relationship between at-risk students and economic factors to conclude that the economic backgrounds of at-risk students profoundly affect their dropout and college-going rates. ESSA also provides additional federal funding for students of low socioeconomic status to help improve college readiness regardless of their status. The College Board (2018) reported the growth of participation of low-income students in AP courses in states that provided funding for low-income students. State funds can provide students with the opportunities to take exams in AP courses related to STEM. States and districts can provide low-income students with funding using Title 1 funds. Title 1, Part A of the Elementary and Secondary Act, or the ESSA provides funding to schools and agencies with a high number of low-income families to help ensure students receive educational opportunities to succeed. Federal funds are allocated to help students reach the academic standards required by each state.

English Learners

The National Center for Education Statistics (NCES) data set from the 2013-2017 report that for school-aged children (5 years and older), English is the predominant language (77%), which is higher than in Texas (63%). Nationally, for students whose first or home language is not English, the predominant language is Spanish (71%), with Chinese being second at four percent. In Texas, children who speak languages other than English at home speak Spanish (90%) (NCES, 2017). Children who speak a language other than English in the local school district (24%) (NCES, 2017) with English being presented at 76 percent. Currently, the local school system does not report languages other than Spanish or English as a home language. Thus, there is a large portion of the

school-age children who have the potential to be classified as ELs and would require additional assistance in the area of college readiness.

Language and AP. Determining if the college preparation courses influence students' decisions to pursue a college degree upon receiving a high school diploma is one of the focus of the study. Additionally, evaluating courses in which high school EL dropouts are enrolled in currently and the courses previously taken will identify if the courses fail to meet EL students' academic needs. Previous studies have found an increase in the relationship between the EL population the high school dropout rate among the Hispanic population (Cook et al., 2012; Cates & Shaefle, 2011; Yoshikawa et al., 2010; Sheng et al., 2011; Kim, 2013). Cook et al. describe the analysis of the typical college rates for Hispanic EL and the interventions of high school counselors that affect their college enrollment. Counselors make interventions to enhance students' knowledge for the opportunities for which they qualify.

Furthermore, this study presents additional factors such as SAT/ACT preparation courses offered to students and the resources made available to them. Cates and Shaefle (2011) provide valuable insight to conclude that there are differences between students enrolled in college preparation programs and at-risk students. Students enrolled in college preparation courses receive additional support for college enrollment. On the other hand, at-risk students' remedial courses and do not receive the same college support (Murphy & Dodd, 2009). The identification of at-risk students' and the factors of academic readiness are evaluated in Yoshikawa et al. (2010). The evaluation in the study provides the racial and ethnic differences of the effects of welfare policies relating to students'

current academic readiness and their later achievement. This study values the relationship of at-risk students' economic factors to conclude that the economic backgrounds of at-risk students profoundly affect their dropout and college-going rate. The studies previously mentioned have focused primarily on EL students' academic readiness at the high school level. Addressing the discrepancy between EL high school dropouts and college-going ELs also includes evaluating their elementary and secondary academic achievement to address the academic gap.

The evaluation of curriculum-based measurement of reading skills at an elementary and secondary level is provided by Ramirez and Shapiro (2006). In this study, the authors evaluate and identify the reading skills of Spanish speaking EL in a bilingual classroom. The findings in the study conclude that Spanish-Speaking EL read less fluently on English passages than general education students across the grades studied. The targeted samples were students enrolled in general education classrooms, and Spanish-speaking EL enrolled in bilingual education classrooms. Besides, the Ramirez and Shapiro study indicates that performance for Spanish-speaking ELs does not read at the same fluent level as general education students. The examination of the rate of change over time in reading reflects the analysis of the difference in the growth of ELs in the school population. The rate of improvement in reading across grades for Spanish-speaking ELs in bilingual programs is significantly slower compared to general education peers. Evaluating EL academic performance in content areas such as reading enhances understanding of academic achievement specific to the EL population. Evaluating EL

academic performance in content areas such as reading, in addition to math and science, will help understand the factors that impact AP enrollment and college readiness for ELs.

Lesser et al. (2016) provide content-specific information of EL at the college level. This college study aimed to distinguish how additional technological resources can enhance college-level EL learners in a beginning statistic class. The authors explain the specific findings of a statistics and probability college course. The article describes studies that have been completed for ELs in other content areas but not introductory probability and statistics. Lesser et al. (2016) provides insights about the investigations directed to a bilingual web-based applet and how it may be used to help EL identify key terms for probability and statistics.

Information Search Process. A high school study conducted by Kim (2013) explores the knowledge development process of EL at a high school. The EL language proficiency level is related to a research assignment assigned in biology and the themed course as to how it influences student learning. This study explains the lack of research among school libraries' support for ELs and the effects on their academic achievement. Understanding the learning process of EL students and recognizing the learning challenges they encounter will help develop effective instructional strategies (Kim, 2013). Kim's (2013) study examined the knowledge development process of EL high school students during their research tasks. The framework used for this Kuhtlthau's Information Search Process (ISP). This framework was selected because it provides a view to helping understand the process of new learning as it also offers a research-based model overviewing human information behavior in various aspects and allows for the

comparison of this study to other studies that have been conducted using the same framework. In addition, including research at a college level will impact finding the variables to conclude if the courses EL high school students are enrolled in truly impact the college-going and dropout rate.

Equity among Hispanic Students and AP Participation

Previous research provides evidence of the connection between Hispanic EL's academic achievements and lack thereof. A variable that many scholars and researchers have evaluated has been the question of equity? Education and equality are aligned to provide equal opportunity to all students. Ndura et al. (2003) study examined the equal participation and representation of Hispanic students in AP classes while evaluating reports of students' college participation. The reports indicate that 70% of today's high school graduates continue to postsecondary education, but only half of those who enroll in a four-year institution leave to complete a degree (Ndura et al., 2003). Students are not receiving rigorous coursework that prepares them to succeed in higher education.

AP and STEM

The state of Texas has addressed the need for STEM education through legislation, specifically House Bill 5 (HB 5). HB5 requires students to complete 22 credits, including four credits in English language arts and three credits each in science, social studies, and mathematics (American Institute for Research, 2015). Additionally, students must select one of five endorsements to pursue: arts and humanities, business and industry, public services, multidisciplinary studies, or STEM. Due to HB5, school districts in Texas have begun to implement incentives for students to graduate with a

focus on STEM areas. High school students are given the choice of what educational avenue they would like to pursue their career interests. HB5 allows all students the choice to take courses they find fit for their interests. The Texas Education Agency (2017-2018) reports the differences in endorsement enrollments by ethnicity. Figure 1 indicates what endorsement high school students choose based on ethnicity. In this case, students can enroll in AP courses in any subject as well as enrolling in math and science AP courses specific to the STEM endorsement and receive college credit for any endorsement they choose.

Figure 1. Texas House Bill 5 Endorsement Choices by Race/Ethnicity.

Race/Ethnicity	Total Endorsements	STEM		Business and Industry		Public Services		Arts and Humanities		Multidisciplinary Studies		No Endorsement Declared	
		N	%	N	%	N	%	N	%	N	%	N	%
White	5960	1103	19%	1019	17%	1047	18%	791	13%	1754	29%	246	4%
Black or African American	3236	262	8%	744	23%	769	24%	322	10%	897	28%	242	7%
Hispanic/Latino	5245	557	11%	1116	21%	1212	23%	701	13%	1343	26%	316	6%
Asian	533	143	27%	64	12%	84	16%	79	15%	163	31%	0	0%
Native Hawaiin/Other Pacific	34	0	0%	0	0%	15	44%	0	0%	19	56%	0	0%
American Indian/ Alaskan Native	32	0	0%	0	0%	17	53%	0	0%	15	47%	0	0%
Two or More Races	275	44	16%	44	16%	61	22%	40	15%	71	26%	15	5%
Total	15315	2109		2987		3205		1933		4262		819	

Students are given the choice of courses and career pathways to take despite their economic, ethnic, and social background. Minority high school students, as well as those who are economically disadvantaged, are allowed to enroll in AP courses. Although students are given five different endorsement choices to enroll in, the highest percentage of each ethnicity enrolls in multidisciplinary studies, according to Figure 1. The table does not break down the participation by gender which can also be an important factor in endorsement choices for students. One of the factors that can be considered as the effect

of student enrollment in advanced placement courses reflects students' gender biases. The cause of gender biases can limit a student's career preparation to enroll in advanced placement courses as well as their career choices in STEM. Beede et al. (2011) reported in the U.S. Department of Commerce Economics and Statistics Administration identified that although women fill close to half of all jobs in the U.S. economy, they hold less than 25 percent of STEM jobs. Stout, Grunberg, and Ito (2016) report the gender disparities among men and women in STEM careers. Addressing the factors that affect student enrollment in science and math preparation courses will help increase the representation of males and women in STEM professions. Card and Payne (2017) identify some factors that affect women to graduate from a university that is less likely than men to specialize in STEM. Women are underrepresented in STEM careers nationwide, statewide, and locally. The gap in STEM among women and men is evident. Women pursue STEM degrees at much lower rates than men (Legewie & DiPrete, 2014).

Summary

The Advanced Placement Program has grown significantly since it was first implemented in 1955. The College Board now offers 38 AP courses available to high school students to participate in and possibly receive college credit. Many studies have contributed to the literature of AP and have found the relationship between college readiness, post-secondary success, and AP participation. A variety of studies have shown the positive outcomes of student's participation in AP courses aligned with college success. Some of the positive outcomes of participating in AP courses include advantages to college admissions as compared to non-AP students. Students who enroll

in AP courses also receive an increase in their weighted GPA as compared to students taking on level courses. Researchers have also found a connection between social, economic, and cultural backgrounds and the effects of participation in AP classes. National and State policies promote participation in AP courses and encourage campuses to reach students of all ethnic backgrounds to enroll in advanced courses. Despite the increase in post-secondary enrollment, educational disparities still exist among African American, Hispanic, and low-income students (Engberg & Wolniak, 2010). The prominence of social, cultural, and economic factors that impact Hispanic students' AP enrollment is evident through previous studies. Additionally, some research suggests that students' level of college readiness and academic preparation is paralleled with negative factors that also contribute to student's AP enrollment and may also be a predictor of students' enrollment in higher educational courses.

Chapter III

Method

The importance of increasing student participation and performance in Advanced Placement (AP) courses and exams are critical to improving STEM preparation. Previous research studies illustrate the positive outcomes of student participation in AP courses (Mason, 2010). Studies on the effects of AP courses reveal that colleges and universities consider GPA and participation in AP courses as an essential criterion for admission (Rivas-Drake, 2008). National, state, and local support and incentives are being offered to promote AP enrollment that is supported by ESSA (College Board, 2018). Unfortunately, not all students, specifically Hispanic students, are taking advantage of these opportunities. Although students have access to AP courses and support, they still face barriers to participating in higher preparation courses. Some of the challenges Hispanic students face in participating in AP courses, particularly STEM courses, could be reflective of their ethnic and social background (Witenko et al., 2016). This study focuses on identifying the effects of Hispanic student's socioeconomic status and status as English Learners (EL) on their college preparation and STEM courses. The data collected for the study was guided by the following research questions:

1. What if any, is the enrollment difference between Hispanic and Non-Hispanic students enrolled in Pre-AP, AP, and Dual Credit Courses?
2. What, if any, is the relationship between Hispanic students' socioeconomic status and the type of AP courses students enroll in geared explicitly towards AP

Science, Technology, Engineering, and Mathematics (STEM), AP Spanish, or AP Other?

3. What, if any, is the relationship between Hispanic students' language status impact on Hispanic students' enrollment in AP and whether or not SES status influences this relationship?

Research Design

This study is designed to help identify the difference of advanced participation of Hispanic students in Dual Credit, Pre-AP, and AP of Hispanic students compared to Non-Hispanics in a large suburban school district in the Southwest. Identifying the socioeconomic differences between Hispanic Economically Disadvantaged (ED) students and Hispanic Non-Economically Disadvantaged (Non-ED) students in AP STEM only and AP Spanish will help identify if socioeconomic status impacts Hispanic students AP STEM and AP Spanish Enrollment. Due to the number of Hispanic students in the district who are also English Learners, the study will also try to determine if Hispanic students' status as English Learners impacts their enrollment in AP STEM, AP Spanish if students are enrolled in two or more AP course. The questions are aimed to find how socioeconomic status and EL can impact Hispanic students in AP STEM courses and increase the representation of Hispanic representation in STEM careers.

Participants/Sample Group

The data collected for the study were analyzed using pre-existing masked data from the school district and was evaluated once permission was granted by the UH Institutional Review Board and the school district. The data included the number of

students in grades 9-12 enrolled in Dual Credit, Pre-AP, AP, and college readiness courses broken down by ethnicity. The total number of students was N = 7906.

The analysis of AP data included previously collected masked data through the College Board, Texas Education Agency, and the school district. Data from the National Center for Educational Statistics was used to determine how students' demographics can affect their academic and college readiness. The data guidelines that were used to gather the data request from the school district for this study are listed below:

- Dual Credit, Pre-AP, and AP enrollment in the school district, including the total number of students enrolled in AP classes broken down by ethnicity (N = 7906).
- Hispanic students economically disadvantaged and not economically disadvantaged (according to TEA standards) and their participation in AP STEM courses, AP Spanish, AP: Other, and participation in more than one or participation in None (N = 2768).
- Hispanic English Learners and Hispanic students Non-English Learners participation in AP: STEM, AP: Only Spanish, AP: other, two or more broken down by Hispanic EL and Hispanic Non-EL (N = 2768).

Data Analysis

This study analyzed pre-existing data using the Chi-Square test for the difference between proportions. The data collected did not involve any student or teacher participation.

Question 1. What if any, is the enrollment difference between Hispanic and Non-Hispanic students enrolled in Pre-AP, AP, and Dual Credit Courses? As the Hispanic

population continues to rise and the representation of Hispanic students in higher preparation courses such as Pre-AP, AP, and Dual Credit continues to be stagnate, specific data with unique contributions was requested. The request for data from the district included the number of high school students by ethnicity enrolled in Pre-AP, AP, Dual Credit, and two or more college readiness courses from the 2018-2019 academic year. The district data set provided all the data except for a column that not linked to a particular course type. Thus, a few students (N=42) were not assigned to a specific course type and labeled as unknown. Table 5 identifies the total number and percent of students who participated in courses (Pre-AP, AP, Dual Credit, Two or More, and Unknown) by ethnicity. From this data, we can determine that the two most favored types of college readiness courses taken by Hispanic students were Pre-AP and Two or More. Thus, Hispanic students are predominately taking courses that are not necessarily helping them defray the cost of college. What is not specifically known, but can be inferred, is which course types constitute the Two or More category and there was no way to disaggregate this data by student. The most likely scenario based on practical experience is that this category is for the course types of Pre-AP plus Dual Credit (neither of which leads to a financial benefit in terms of the cost of college). The reason that AP is highly unlikely to be included in this category is that there are a cost and placement test associated with taking AP courses, as discussed earlier. Typically, if a student places into an AP course, they will not be enrolling in Pre-AP or Dual Credit.

Table 5

Student participation by ethnicity - all

		African American	Hispanic	Caucasian	Native American	Asian/Pacific Islander
Pre-AP	N	605	1029	900	5	66
		40%	37%	28%	22%	18%
AP	N	143	258	313	5	38
		9%	9%	10%	22%	10%
Dual Credit	N	117	234	213	2	16
		8%	8%	7%	9%	4%
Two or more	N	629	1230	1812	11	238
		42%	44%	56%	48%	65%
Unknown	N	14	17	3	0	8
		0.9%	0.6%	0.1%	0%	2.2%
TOTAL	7906	1508	2768	3241	23	366

Question 2. What, if any, is the relationship between Hispanic students' socioeconomic status and the type of AP courses students enroll in geared explicitly towards AP Science, Technology, Engineering, and Mathematics (STEM), AP Spanish, or AP Other? To answer question two, data were obtained using the indicators provided by the district. There are a total of 2768 students identified as Hispanic (see Table 5). The district provided socioeconomic status according to their two variables, economically disadvantaged or not economically disadvantaged instead of Free Lunch, Reduced Lunch, or Paying for Lunch. The school district follows the National School Lunch Program

Requirements and Texas Education Agency guidelines to define a student's socioeconomic status based on their free, reduced, or paying for lunch eligibility. Students are classified as low-socioeconomic status if they qualify for free or reduced lunch or non-low socioeconomic status if they do not qualify for free or reduced lunch.

Table 6 displays the enrollment of Hispanic students based on Economically Disadvantaged (ED) and Non-Economically Disadvantaged (Non-ED) in AP STEM only and AP Spanish only and AP Other. A visual review of the data shows that students who are Non-ED tend to take more AP STEM and AP Other courses than their ED Hispanic peers while ED did not influence AP Spanish enrollment. Thus, identifying statistically if the economic status of Hispanic students is independent of the type of AP course students enroll in will help improve Hispanic participation in STEM-related courses.

Table 6

Socioeconomic Status by AP Course for Hispanic only Students

		ED	Not ED
AP STEM	N	172	275
AP Spanish	N	27	30
AP Other	N	274	480
TOTALS		473	785

Note. ED = Economically Disadvantaged.

Question 3. What, if any, is the relationship between Hispanic students' language status impact on Hispanic students' enrollment in AP and whether or not Socioeconomic Status (SES) status influences this relationship? Previous studies have found a

relationship between Hispanic EL and their lack of participation in college preparation courses such as Dual Credit, Pre-AP, and AP (Walker & Pearsall, 2012; Witenko et al., 2016). According to the data in the current study (see Table 7), Hispanic students identified as EL account for approximately 6% of the Hispanic students in participation in each college preparation course.

Table 7

Hispanic English Learner and Non-English Learner participation

		Hispanic + EL	Hispanic + Non-EL	Totals
Pre-AP	N	107	922	1029
		67%	35%	
AP General	N	21	237	258
		13%	9%	
Dual Credit	N	8	226	234
		5%	9%	
Two or more	N	24	1206	1230
		15%	46%	
None	N	0	17	17
		0%	11%	
Total		160	2608	2768

It is also worth reviewing how any combination of factors (SES[ED] or EL or Both) may influence a student's likelihood to be enrolled in AP courses. There are 1432 Hispanic students not assigned to EL or ED (Table 8), and 45% of them are not taking AP courses. When conducting a visual analysis, the number of Hispanic students taking

no AP courses increases with the addition of the EL (80%), ED (62%), or EL+ED (75%) label.

Table 8

Hispanic ED and EL Status on AP courses

		Hispanic	Hispanic + EL	Hispanic + ED	Hispanic EL+ED	Totals
Totals		1432	44	1176	116	2768
AP STEM	N	275	0	168	4	447
		19%	0%	14%	3%	19%
AP Spanish	N	29	1	13	14	57
		2%	2%	1%	12%	2%
AP Other	N	473	7	263	11	754
		33%	16%	22%	9%	31%
Two or more	N	16	1	5	0	22
		1%	2%	0.4%	0%	1%
None	N	639	35	727	87	1488
		45%	80%	62%	75%	62%

Note. Percentages may not add up to 100% due to rounding.

Chapter IV

Results

The study was designed to identify the difference between college readiness participation of Hispanic students in Dual Credit, Pre-AP, and AP courses compared to Non-Hispanic students in a large urban school setting. The study also aimed to identify the effect of Hispanic students' socioeconomic status and their status as English Learners (EL) in AP STEM courses and AP Spanish. In order to find the course enrollment differences between ethnicities, descriptive statistics and chi-square tests were analyzed using SPSS, a statistical software program. The independent variable used to find the relationship between ethnicities and Pre-AP, AP, and Dual Credit courses were Hispanic and Non-Hispanic student population, and the dependent variable was the enrollment in Pre-AP, AP, and Dual Credit courses.

Research Question 1

What if any, is the enrollment difference between Hispanic and Non-Hispanic students enrolled in Pre-AP, AP, and Dual Credit Courses? Figure 2 shows a visual analysis of the difference in students enrolled in Dual Credit, Pre-AP, and AP broken down by ethnicity. This breakdown shows there are differences in enrollment by ethnicity. There are more Hispanic students in Pre-AP than White or African American, while there are more White students in AP than Hispanic or African American. The categories of African American, White, Native American, and Asian/Pacific Islander ethnicities were collapsed and labeled Non-Hispanic to answer the second question. Thus, Figure 3 presents the total number of students (n = 7906) divided into Hispanic (n

= 2768) and Non-Hispanic (*n* = 5138) groups. This data shows that overall Hispanic students had a lower participation rate in all courses compared to Non-Hispanic students.

Figure 2. College readiness course participation by ethnicity.

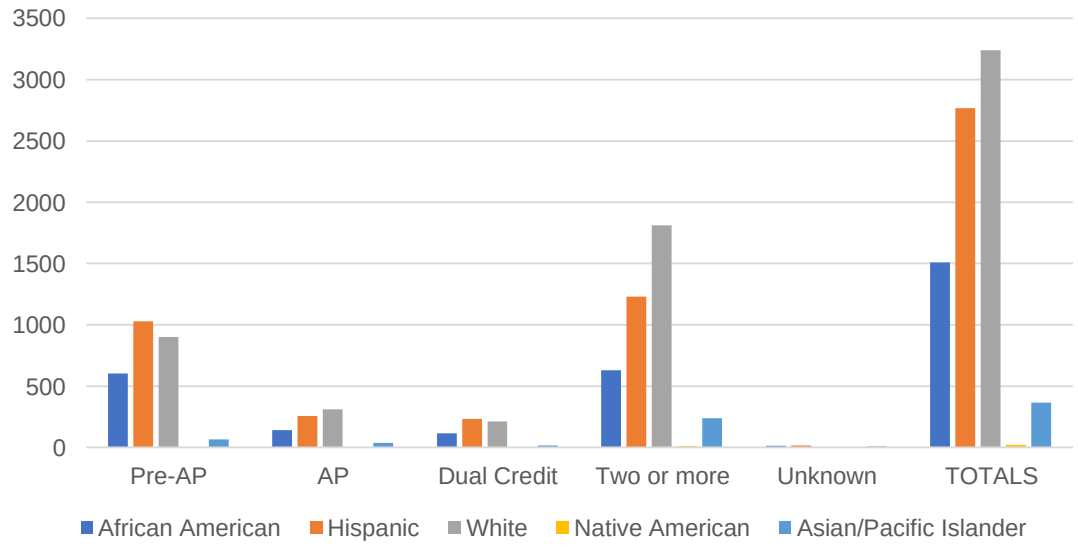
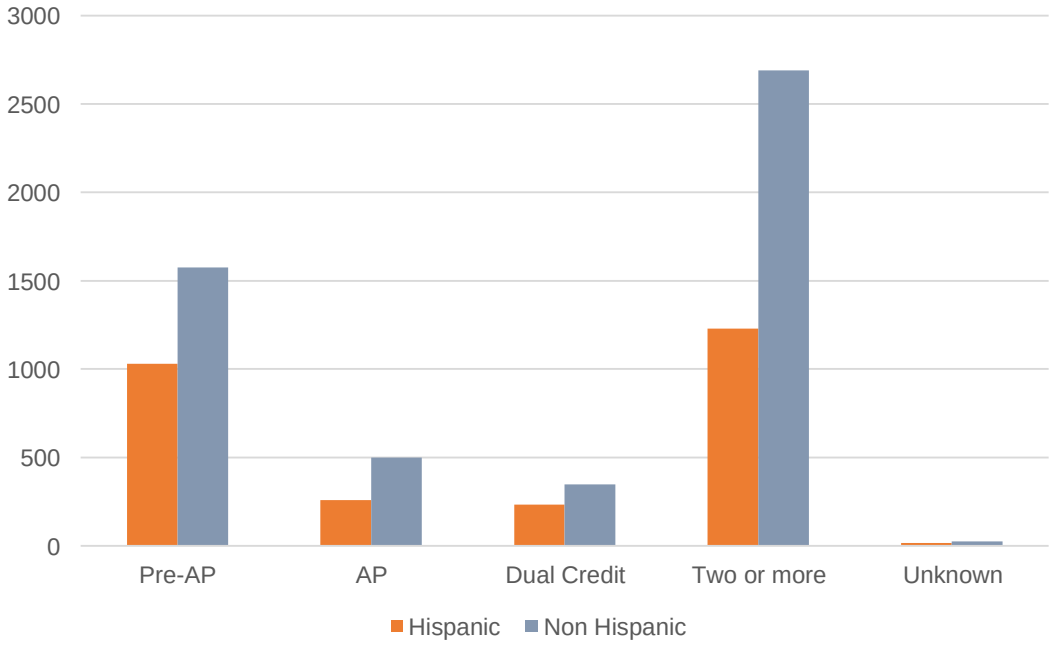


Figure 3. Hispanic and Non-Hispanic college readiness course participation.



The next step was to take a closer look at the data to determine the distribution of the students across the *course type*. Overall, Hispanic students are taking fewer college readiness courses (*n*=2768) than their non-Hispanic peers (*n*=5138). The data presented in Table 9 show that the representation of Hispanic students *within Ethnicity* favored taking 2+ college readiness courses (44%). The same is true for Non-Hispanic students who favored taking 2+ college readiness courses (52%). *Within Ethnicity*, Hispanic students had a more even distribution between AP Only and Dual Credit (9.3% to 8.5% respectively). These enrollment numbers were comparable to their Non-Hispanic peers (9.7% v. 6.8%, respectively) when controlling for Ethnicity.

This number shifted when *controlling for course type by Ethnicity*. Hispanic students take fewer AP courses (35%) than their Non-Hispanic peers (65%). When combining the DC, Pre-AP, and 2+ columns, there is a clear pattern of Hispanic students (*n*=2493) who are not taking AP courses which have an inherent financial benefit – the reduction in college tuition over time.

Table 9
Hispanic and Non-Hispanic College Readiness Course Enrollment

Ethnicity	AP	DC	Pre-AP	2+	UK	Total
Hispanic						
Count	258	234	1029	1230	17	2768
% within Ethnicity	9.3%	8.5%	37.2%	44.4%	.60%	100%
% within Course Type	34.1%	40.2%	39.5%	31.4%	40.5%	35%
% of Total	3.3%	3%	13%	15.6%	.20%	35%
Non-Hispanic						
Count	499	348	1576	2690	25	5138
% within Ethnicity	9.7%	6.8%	30.7%	52.4%	.50%	100%
% within Course Type	65.9%	59.8%	60.5%	68.6%	59.5%	65%
% of Total	6.3%	4.4%	19.9%	34%	.30%	65%
Total						
Count	757	582	2605	3920	42	7906
% within Ethnicity	9.6%	7.4%	32.9%	49.6%	.50%	100%
% within Course Type	100%	100%	100%	100%	100%	100%
% of Total	9.6%	7.4%	32.9%	49.6%	.50%	100%

Note. UK=unknown

The Chi-Square approach was used as the variables in this study were categorical (i.e., ethnicity and course enrollment). The results (Table 10) show a p-value of .000 less than .05, indicating that there is a relationship between ethnicity and course enrollment. Therefore, the answer to the first question is there is an enrollment difference between

Hispanic and Non-Hispanic students enrolled in Pre-AP, AP, and Dual Credit Courses with Hispanic students taking fewer college readiness courses than their Non-Hispanic peers.

Table 10

Hispanic and Non-Hispanic College Readiness Course Enrollment Chi-Square Results

	Value	df	Asymptotic Sig. (2-sided)
Pearson Chi-Square	52.567	4	.000
Likelihood Ratio	53.402	.000	
N of Valid Cases	7906		

Note. 0 cells (0.05) have expected count less than 5. The minimum expected count is 14.70.

Research Question 2

What, if any, is the relationship between Hispanic students' socioeconomic status and the type of AP courses students enroll in geared explicitly towards AP Science, Technology, Engineering, and Mathematics (STEM), AP Spanish, or AP Other? It is necessary to focus on the effect of socioeconomic status on Hispanic student enrollment in AP STEM and AP Spanish to help improve Hispanic representation in STEM-related courses. The district provided data that included Hispanic student population (n = 2768) broken down into two categories: Hispanic Economically Disadvantaged (ED) (n = 1292) and Hispanic Non-Economically Disadvantaged (non-ED) (n = 1476) and their enrollment in AP STEM, AP Spanish, or AP Other (Figure 4) which visually shows that ED status does impact AP enrollment.

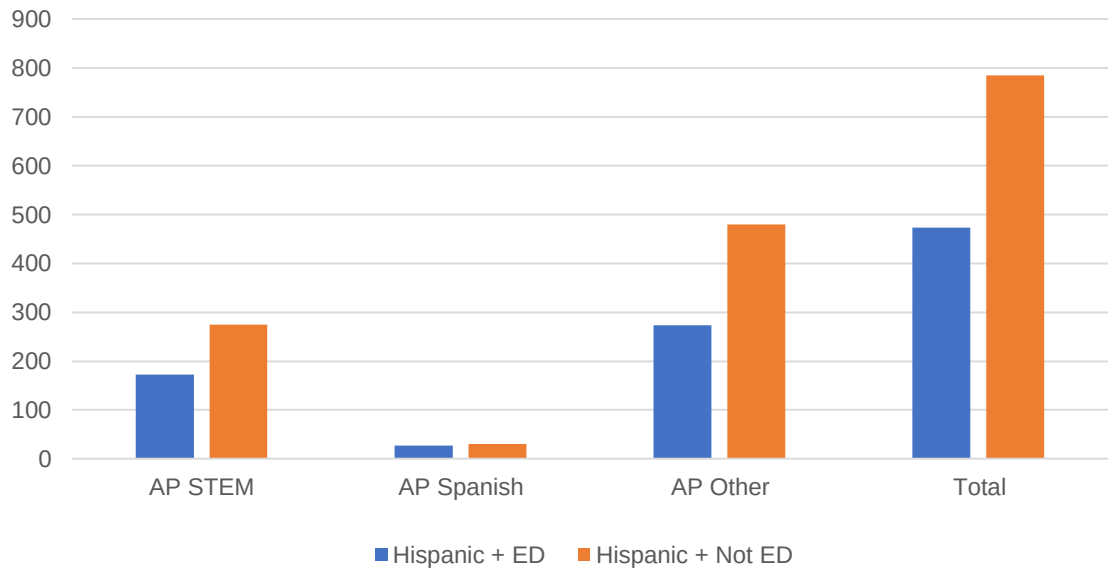


Figure 4. Hispanic + ED versus Hispanic + Non-ED AP Enrollment.

Table 11 indicates the frequency at which students participate in the various types of AP specific courses. The distribution of non-ED (*n*=1476) to ED (*n*=1292) students were more comparable than other tables presented in this study. When determining the distribution *within a course type*, the column percentage was reviewed. Of the Hispanic students enrolled in AP STEM, the distribution favored Hispanic students classified as non-ED (62%) over Hispanic students classified as ED (39%). AP Other enrollment showed a distribution that favored Hispanic students classified as non-ED (64%) over Hispanic students classified as ED (36%). AP Spanish enrollment was the most aligned between ED (47%) and non-ED students (53%) with an AP None close to that level with ED enrollment at 45% and non-ED enrollment at 55%. A review of the AP More found that Hispanic students not classified as ED (non-ED) were enrolled in two or more AP courses (77%) than their ED peers (23%). When a review within the classification of ED

or non-ED status, similar enrollment distributions are found between the two groups. AP More has the lowest enrollment, followed by AP Spanish, AP STEM, AP Other, and AP None with the highest enrollment. Thus, there is a relationship between Hispanic students' socioeconomic status, and the type of AP courses students enroll in geared explicitly towards AP STEM, AP Spanish, or AP Other in that students who are economically disadvantaged do not take these courses at the same rate as their non-ED Hispanic peers.

Table 11

Frequency of Economic Disadvantage by AP Courses

	AP More	AP None	AP Other	AP Spanish	AP STEM	Total
Non-ED						
Frequency	17	674	480	30	275	1476
Percent	.6%	24 %	17%	1%	10%	53%
Within Non-ED	1.15	45.66	32.52	2.03	18.63	
Col %	77.27	45.30	63.66	52.63	61.52	
ED						
Frequency	5	814	274	27	172	1292
Percent	.2%	29%	10%	1%	6%	47%
Within ED	0.39	63.00	21.21	2.09	13.31	
Col Pct	22.73	54.70	36.34	47.37	38.48	
Total	22	1488	754	57	447	2768
	0.8%	54%	27.24%	2.06%	16.15%	100.0

Note. The percentages may not add up to 100 due to rounding.

The statistical analysis (Table 12) shows a Chi-Square of 88.04, which is significant ($p<.0001$), indicating that ED had a significant effect on taking an AP course. In other words, the answer to the second research question is that there is a relationship

between Hispanic students' socioeconomic status and the type of AP courses students enroll in geared explicitly towards AP Science, Technology, Engineering, and Mathematics (STEM), AP Spanish, or AP Other. Specifically, Hispanic students identified as economically disadvantaged do not enroll in AP courses at the same rate as their Hispanic non-ED peers. Indeed, they have a lower rate of enrollment.

Table 12

Statistics for Economic Disadvantage by AP Courses

Statistic	DF	Value	Prob
Chi-Square	4	88.048	<.0001
Likelihood Ratio Chi-Square	4	88.977	<.0001
Mantel-Haenszel Chi-Square	1	40.241	<.0001
Phi Coefficient		0.178	
Contingency Coefficient		0.175	
Cramer's V		0.178	

Research Question 3

What, if any, is the relationship between Hispanic students' language status impact on Hispanic students' enrollment in AP and whether or not SES status influences this relationship? This is different from the first question, which reviewed all ethnicities for all college readiness courses. The visual analysis of Figure 5 shows that when a student is identified as Hispanic without the EL or ED classification, they are more likely to enroll in AP courses of any type than their Hispanic peers who also have the classification of EL; ED; or EL+ED. By combining the two bars for ED (Hispanic +ED and Hispanic EL+ED), the total represents 814 of the Hispanic students in the None column (no AP

courses), whereas Hispanic and Hispanic +EL represent 674 of the Hispanic students in the None column. This is a trend found in the other columns in Figure 5.

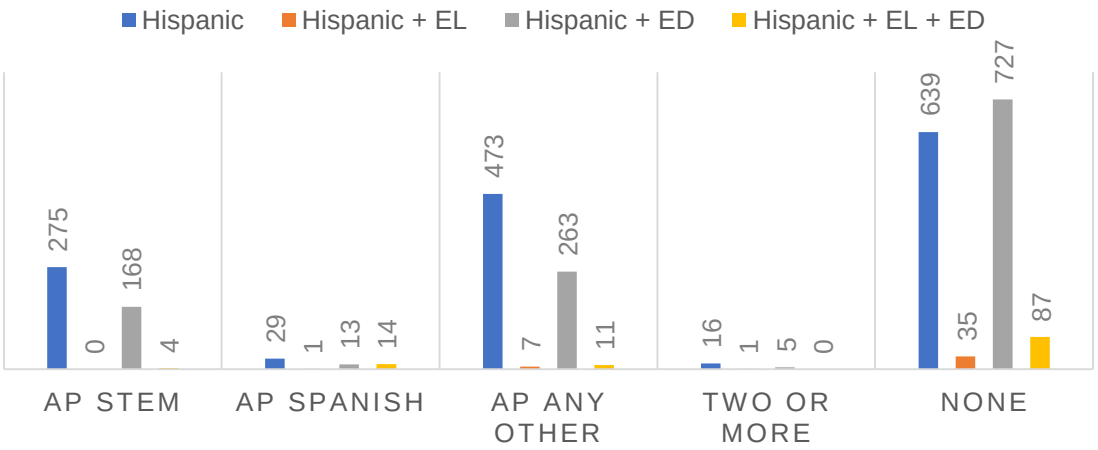


Figure 5. College readiness course enrollment by EL and ED status.

Table 13 displays the frequency and percent of EL status on AP Course taking. Hispanic students identified as Non-ELs are a more substantial portion of this study's sample (94% non-EL to 6% EL). The first item to review is the number of students who are Hispanic who does not take AP courses *regardless of language status* (*n*=1488 of the 2768 total sample of Hispanic students). A more specific review finds that *within language status* (% within non-EL and % within EL), the rate at which Hispanic students classified as non-EL do not take AP courses (52%) is lower than the rate of their EL classified Hispanic peers (76%). To answer the question, is there a relationship between Hispanic students' language status impact Hispanic students' enrollment in AP the percentage of students taking AP courses, specific AP courses were reviewed. First, 95% of Hispanic students who *were not* identified as EL were enrolled in at least two AP courses (AP More) compared to only 5% of Hispanic students *who were* identified as EL.

Ninety-eight percent of Hispanic students who *were not EL* enrolled in AP Other courses at a higher rate than their EL peers (98% v. 2%, respectively). AP Spanish saw less of a disparity in enrollment, with 74% of Non-EL Hispanic students taking the course versus 26% of their EL peers. Finally, AP STEM had the largest disparity with 99% of the Non-EL Hispanic students enrolled versus 1% of their EL peers.

Table 13

Effects of EL Status on AP Course Taking

	AP More	AP None	AP Other	AP Spanish	AP Stem	Total
Non-EL						
Frequency	21	1366	736	42	443	2608
Percent	.8%	49%	27%	2%	16%	94%
% Within non-EL	.81%	52.38%	28.22%	1.61%	16.99	
Col %	95.45%	91.80%	97.61%	73.68%	99.11%	
EL						
Frequency	1	122	18	15	4	160
Percent	.04%	4%	.65%	.54%	.14%	6%
% Within EL	.63%	76.25%	11.25%	9.38%	2.50%	
Col %	4.55%	8.20%	2.39%	26.32%	0.89%	
Total	22	1488	754	57	447	2768
	.79%	53.76%	27.24%	2.06%	1.65%	100%

The statistical analysis shows the Chi-Square 95.71 (Table 14), which is significant ($p<.0001$), indicating that EL had a significant effect on taking an AP course. Hispanic students classified as EL enroll in college readiness courses at a lower rate their Hispanic non-EL peers. Therefore, the answer to the first part of the third research question is that there is a relationship between Hispanic students' language status impact on Hispanic students' enrollment in AP. As with the answers to the first two research questions, the consequence of this relationship bears a financial burden on Hispanic students who are classified as ELs when it comes to earning a four-year degree at an institute of higher education.

Table 14

Effects of EL Status on AP Course Taking

Statistic	DF	Value	Prob
Chi-Square	4	95.71	<.0001
Likelihood Ratio Chi-Square	4	89.24	<.0001
Mantel-Haenszel Chi-Square	1	25.29	<.0001
Phi Coefficient		0.19	
Contingency Coefficient		0.18	
Cramer's V		0.19	

Given the data available, it was possible to answer whether language status made a difference in course enrollment and whether socioeconomic status influenced any differences found. The first set of data for this analysis is the effect of EL status on AP courses when controlling for economically disadvantage status (see Tables 15-18). The data indicate that students *not* categorized as both ED and EL have a higher frequency of

taking AP courses than their peers who *are* categorized as ED and EL. Figure 6 provides the visual contrast of the Hispanic students who are *not* economically disadvantaged (blue hues) to their Hispanic peers classified as economically disadvantaged (orange hues).

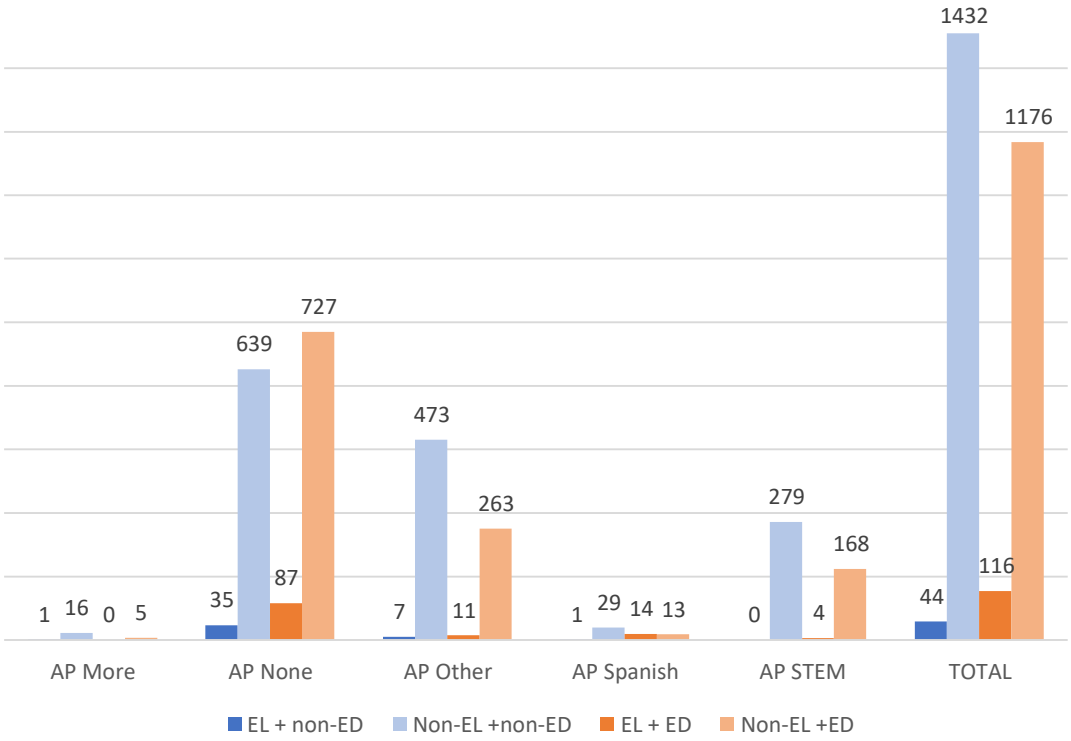


Figure 6. Distribution of Hispanic Students by Language Status and SES

The Tables are presented first, and the discussion follows.

Table 15

Effects of EL Status on AP Course Taking Controlling for ED (non-ED students displayed)

	AP More	AP None	AP Other	AP Spanish	AP Stem	Total
Non-EL						
Frequency	16	639	473	29	279	1432
Percent	1%	43%	32%	2%	19%	97%
EL						
Frequency	1	35	7	1	0	44
Percent	.07%	2%	.5%	.07%	0	3%
Total	17	674	480	30	275	1476

Table 16

Effects of EL Status on AP Course Taking Controlling for ED (Non-ED)

Statistic	DF	Value	Prob
Chi-Square	4	24.20	<.0001
Likelihood Ratio Chi-Square	4	31.15	<.0001
Mantel-Haenszel Chi-Square	1	19.23	<.0001
Phi Coefficient		0.13	
Contingency Coefficient		0.13	
Cramer's V		0.13	

Table 17

Effects of EL Status on AP Course Taking Controlling for ED (ED students displayed)

	AP More	AP None	AP Other	AP Spanish	AP Stem	Total
Non-EL						
Frequency	5	727	263	13	168	1176
Percent	.4%	56%	20%	1%	13%	91%
EL						
Frequency	0	87	11	14	4	116
Percent	0	7%	.9%	1%	.3%	9%
Total	5	814	274	27	172	1292

Table 18

Effects of EL Status on AP Course Taking Controlling for ED (ED)

Statistic	DF	Value	Prob
Chi-Square	4	81.71	<.0001
Likelihood Ratio Chi-Square	4	59.36	<.0001
Mantel-Haenszel Chi-Square	1	5.21	.0225
Phi Coefficient		0.25	
Contingency Coefficient		0.24	
Cramer's V		0.25	

Hispanic students who are classified as both English Learners (EL) and Economically Disadvantaged (ED) are less likely to take AP courses than their peers.

Thus, there is a significant relationship between EL and Non-EL when accounting for SES [ED]. There is less of a difference between ED and EL than for Non-ED and Non-EL. In essence, Hispanic students who are English learners and qualify for free or reduced lunch are less likely to take AP courses than Hispanic students who are not English learners and do not qualify for free or reduced lunch. Ultimately language status (EL) is what makes the difference. Being economically disadvantaged matters for ELs but not for Non-ELs, specifically in the sense of 'do you take AP classes' as opposed to 'what kind of AP classes' do you take.

The statistical analysis for all three tables presented for the third research question, show the Chi-Squares at 95.71 (Table 14), 24.20 (Table 16), and 81.71 (Table 18) which were all significant ($p<.0001$), indicating that EL had a significant effect on taking an AP course and that ED influenced whether or not they took an AP course. Thus, the answer to the second portion of research question three, as described above, is that there is a relationship between Hispanic students' language status impact Hispanic students' enrollment in AP and SES status does influence this relationship for college readiness courses in the form of lower course enrollment in college readiness courses.

Summary

This chapter presented the data analysis and findings from the data collection provided by the school district. Various data analysis methods were used to answer the research questions. Overall, more Hispanic students participate in AP STEM only courses than AP Spanish only courses. The results indicate that Hispanic students in grades 9-12 enroll in college readiness courses such as Dual Credit, Pre-AP, and AP

courses at a lower rate than Non-Hispanics. The data further indicates that Hispanic students who are of low socioeconomic status also enroll in college readiness courses at a lower rate than Hispanic students who are non-economically disadvantaged. Hispanic English Learners also have a lower participation rate in AP courses as Hispanic Non-English Learners. Chapter five provides further discussion of the findings.

Chapter V

Discussion

Previous studies have found the positive effects of students' college preparation through their involvement in Advanced Placement (AP) courses. The AP program and the partnerships with colleges and universities have significantly grown since its first initiation in 1955. Students' AP participation is one of the factors that is considered by colleges and universities when applying for college admission (Walker & Pearsall, 2012). College Board implemented the AP program to help high school students prepare for college rigor while still in high school. Although all students have access to enroll in AP courses, students of specific ethnic backgrounds encounter barriers to their ability to enroll in these courses. Even students who are considered to have AP potential do not enroll in AP courses. For example, according to the College Board 2014 Report to the Nation, four out of ten Hispanic high school students that are considered to have AP potential enroll in AP science course.

The purpose of the study was to help identify the differences between Hispanic and Non-Hispanic students and their enrollment in college readiness courses such as Pre-AP, AP, and Dual Credit courses. This study also aimed to identify the effect of Hispanic students' socioeconomic status and Hispanic students' status as English Learner (EL) on Hispanic student enrollment in AP STEM and AP Spanish courses.

Research Question 1

What if any, is the enrollment difference between Hispanic and Non-Hispanic students enrolled in Pre-AP, AP, and Dual Credit Courses?

The study examined the difference between student enrollment in Pre-AP, AP, and Dual Credit courses among Hispanic and Non-Hispanic students. When reviewing the data, it appears that for this sample, Hispanic students are not taking AP courses at the rate of their Non-Hispanic peers. As evidenced by the data and the literature review, this is an issue that needs to be addressed. The College Board found that underrepresented minorities can and should enroll in AP courses they do not. The College Board provides incentives for enrollment and reduces the cost of the required placement test. Potential reasons for the discrepancy may not be evident in the data but instead in the culture of the educational setting. For example, it is essential to understand the process of entering the AP system. As with any system where there is a common entry point, the question arises about the gatekeeper or the person who controls the entry point. Ohrt et al. (2009) found that teachers and counselors did play an important role as the gatekeeper in these courses and provided guidance on how to become more comprehensive in the review role as the gatekeeper.

It is also possible that the students do not know enough about the AP enrollment process to determine interest in taking these courses. Cultural differences and first-generation status may negatively impact the representation of Hispanic students in the AP courses. As mentioned by Desmond and Turley (2009), Hispanic families' views on post-secondary education are not always aligned with the mainstream culture of the U.S. educational system. Hispanic families tend to have an expectation of financial contributions upon high school graduation and do not always understand the benefits of post-secondary education. When considering AP courses, the financial burden of the

placement test may further alienate the family from taking this critical first step. Thus, students do not have an opportunity for these college readiness courses that have the potential to reduce their financial costs for secondary education. Therefore, training of educational personnel, students, and their parents will be required to help move this needle forward. The training would need to be conducted in both English and Spanish to ensure that parents whose first language is not English have access to the content of the training and do not have to rely on their children or their limited knowledge of English for the translation of the materials.

Research Question 2

What, if any, is the relationship between Hispanic students' socioeconomic status and the type of AP courses students enroll in geared explicitly towards AP Science, Technology, Engineering, and Mathematics (STEM), AP Spanish, or AP Other?

The study focuses on finding the enrollment differences between Hispanic students' socioeconomic status (economically disadvantaged in this study) and students in AP courses, specifically AP STEM and AP Spanish. The importance of AP enrollment in Spanish is based on previous data that indicates a large majority of students who speak a language other than English at home speak Spanish. For example, 23% of children speak a language other than English at home, and of this group, 74% speak only Spanish at home (NCEIS, 2017). In Texas, 37% of children speak languages other than English at home, and of this group, 89% only Spanish at home (NCEIS, 2017). In the local school district, 24% of children speak languages other than English at home, and of this group, 83% speak only Spanish at home (NCEIS, 2017). However, as this study presented, ED

does impact enrollment in the sense of whether or not students take AP courses and not in the sense of the pattern, of course, taking (AP STEM v AP Spanish).

When looking at the pattern of course taking, one cannot assume that if a student is a native Spanish speaker, they should take AP Spanish. AP Spanish is a course that has higher academic vocabulary than conversational Spanish. Thus, it is possible that a student may lack the vocabulary in Spanish to feel comfortable taking an AP Spanish course. This may be one reason why the AP Spanish enrollment was the lowest of the enrollments in AP courses. It may also be the case that students who speak Spanish feel like a course in AP Spanish will be redundant with what they already know about speaking Spanish. Both are issues that can be addressed through proper communication with interested parties, including the gatekeeper.

This study also focused on the representation of Hispanic students in STEM-related fields. Previous studies have shown that Hispanic students continue to lag other ethnicities in STEM-related fields and AP courses (Garland & Rapaport, 2017). As evidenced by the data, AP STEM collectively is the second-lowest AP Course in terms of enrollment by Hispanic students. Across the nation, entry into STEM preparatory courses remains low. Given the variety of careers that one can enter with a STEM focus, a potential issue may be in the lack of understanding of potential career paths one can take with this type of degree. Training college and career counselors, having materials available in Spanish for both parents and students and having a career day that embraces both the college *and* the career aspects of STEM may be beneficial in helping increase enrollment of Hispanic students. Students of low SES may not consider participation in

higher preparation courses to be necessary based on their personal identity. In some cases, students of low SES may not even consider enrollment in post-secondary education; therefore, preparation for post-secondary education is never considered. Students of low SES may also be the first of their family to receive public education in the U.S. while students are adjusting to the new educational setting participating in advanced courses is not considered.

Research Question 3

What, if any, is the relationship between Hispanic students' language status impact Hispanic students' enrollment in AP and whether or not SES status influences this relationship?

Hispanic students' status as English Learners did influence their participation in AP courses but not their pattern of courses taken. This was influenced by the socioeconomic status of the student. When a Hispanic student is classified as both an English Learner (EL) and Economically Disadvantaged (ED), their rate of taking AP courses of any kind is diminished by over fifty percent. Several areas may be responsible for this decrease in AP course-taking. First, the cost associated with the AP Program may be too much to bear for a family in the lower SES bracket. When looking at the reduced rates, there is still a $16 charge that may seem trivial to most but can make a difference to a low SES family. Options for entry fees to be removed is one possible solution. Second, there may be cultural differences in how families look at the value of AP courses. Some families may not see a financial benefit for students to take the AP course over getting a regular high school diploma with standard coursework as college may not be a priority.

This leads to the third discussion point of communication. It is well documented that parents in poverty have a lower literacy rate than parents who are not in poverty, and this is exacerbated by language differences (50% lack a high school education in their first language (ProLiteracy, 2019). Add to this a second language, and one may find that communication that is conducted in English only or Academic Spanish may be difficult for parents to decipher on their own. Thus, schools and guidance counselors (i.e., the gatekeepers), in particular, need to find innovative ways to work with parents to break down these cultural barriers.

Overview of the Study

This study indicates that although students have opportunities to enroll in college readiness courses such as Dual Language, Pre-AP, and AP courses, Hispanic students continue to be underrepresented compared to Non-Hispanic students. Hispanic students who are interested in pursuing a degree in higher education are not prepared for college rigor based on their lack of participation in advanced courses. Consequently, Hispanic students drop out of secondary education due to their lack of preparedness (Witenko et al., 2016). Hispanic students who do enroll in AP courses enroll in more AP STEM courses as compared to AP Spanish only courses. Overall Hispanic students enroll in fewer AP courses (35%) when compared to their Non-Hispanic peers (65%). The lack of participation of Hispanic students can be affected by their socioeconomic status and status as English Learners. This study identified the difference in course participation among Hispanic Economically Disadvantaged students versus Non-economically disadvantaged students and their enrollment in STEM AP courses, AP Spanish, and

enrollment in more than one. The study found that fewer ED Hispanic students participate in STEM-related courses than Hispanic students who are Non-ED. Hispanic students who are ED also enroll at a lower rate in Spanish AP courses as compared to Non-ED Hispanic students. Hispanic students who enroll in two or more AP courses are underrepresented by ED Hispanic students; more Non-ED Hispanic students enroll in two or more AP courses. Socioeconomic status does impact Hispanic student enrollment in college readiness courses such as STEM AP, AP Spanish, and AP any courses.

Hispanic students lack enrollment in AP courses that are impacted by their status as English Learners. This study found the differences of course enrollment such as AP STEM, AP Spanish, AP: Other, and two or more AP between Hispanic EL and Non-Hispanic EL. Hispanic EL students enroll in AP Spanish at a higher rate when compared to AP STEM courses only. Students' status as English Learners contributes to their participation in AP Spanish because Spanish could be their native language. However, Hispanic students who are Non-EL enroll any/other AP courses at a higher rate than EL. Hispanic students' status as English Learners does affect their enrollment in AP courses.

Ultimately, the lack of Hispanic student representation in AP courses has several causes which can be addressed through the training of teacher and counselors as the gatekeepers as well as for the parents and students as the end-users. The consequences of not being represented in the AP courses can create further financial burdens for students who do want to attend post-secondary education. Passing the AP exams can reduce the amount of college coursework to be completed. Thus, the tuition and fees at the post-secondary institutions will likely be reduced. Consequently, many students who are ED

and require assistance the most can reduce the time taken to achieve a degree and reduce the financial burden of college attendance.

Limitations

This study was conducted in a diverse school district within the greater Houston area. One limitation was the dataset from the school district had 42 students listed as 'Unknown' or 'None" in terms of the type of AP Course but was categorized under Ethnicity. This category was kept in the analysis, although, in the future, a comprehensive data set without unknown variables should be used. It is also the case that the data used for the district did not include student ethnicity of two or more races. The study only focused on the differences among African American, Caucasian, Native American, and Asian/Pacific Islander (Non-Hispanics) and Hispanics enrollments in Dual Credit, Pre-AP, and AP courses. For future studies, a more complete list of ethnicities would be useful in understanding the dynamics of Hispanic students identifying as a category other than only Hispanic (e.g., such as Hispanic Caucasian).

Another area to incorporate into a study of this type is one that looks at the communication types of entre into an AP course. It is important to understand if there are barriers that easily removed (e.g., communication in Spanish as well as English) or if it is a training issue with a guidance counselor (i.e., the 'gatekeeper').

Conclusions

College readiness courses such as Pre-AP, AP, and Dual credit offer high school students opportunities to prepare for secondary education. As the dependence in STEM-related fields is growing it is important to identify what barriers students will encounter

affecting their college preparation in STEM-related courses beginning at the high school level. Students of all ethnic backgrounds can enroll in college readiness courses, but Hispanic students continue to be unrepresented (Edwards & Sawtell, 2013). This study indicates that Hispanic students' AP participation is impacted by the student's socioeconomic status and status as an English Learner. The study found that Hispanic students who are not economically disadvantaged enroll in more AP courses that are not limited to AP STEM and AP Spanish. The study also found that Hispanic Non-English Learners enroll in more AP courses than English Learners. Addressing the barriers that Hispanic students encounter when enrolling in college readiness courses can help improve Hispanic student participation in college readiness courses and STEM-related fields.

Chapter VI

Action Plan

Since the initiation of the Advanced Placement (AP) program in 1955, high school students are allowed to receive college credit for participation and performance in AP classes. Previous research suggests that there are many beneficial outcomes of AP participation, such as preparation for higher education courses and college credit (Klopfenstein, 2004). Although there are many positive outcomes for advanced placement, many students do not take advantage of the opportunities. Hispanic students' AP participation and performance can be related to many factors including student socioeconomic status, teacher influence, and parent support. Teachers play an important role in students' participation in college preparation classes (Mason, 2010). Providing teachers, adequate support on student indicators and training can assist efforts to help increase student participation. According to the College Board (2015), student indicators that determine how successful a student will be in AP courses is based on their performance on PSAT/NMSQT and SAT test. AP Potential helps identify students who are likely to succeed on AP exams (College Board, 2018). Research suggests there is a moderate to strong relationship between PSAT/NMSQT, SAT and AP scores (Zhang, Patel, & Ewing, 2014). Other than the AP Potential, teachers do not have a set-based criterion that serves as indicators for students to enroll in AP courses. The College Board does offer a Conversation Starter that is a guide for teachers and counselors to use for students who are interested in AP classes (College Board, 2017). Essentially the only formal data teachers apply to promote AP enrollment is based on student performance on

PSAT/NMSQT and SAT test. Providing teachers training on AP performance indicators can help diversify student AP participation and enrollment.

Materials

Content. The professional development training to help teachers implement AP indicators will discuss the following topics or variables

Variables.

- *Advanced Placement Program*: The AP program has significantly grown since it was first implemented in 1957. The College Board now offers 38 AP courses available to high school students to participate in and possibly receive college credit.
- *College Readiness and AP*: Studies have shown the positive outcomes of student's participation in AP courses aligned with college success. Some of the positive outcomes of participating in AP courses include advantages to college admissions as compared to non-AP students. Students who enroll in AP courses also receive an increase in their weighted GPA as compared to students taking on level courses.
- *Social Factors*: Researchers have also found a connection between social, economic, and cultural backgrounds and the effects of participation in AP classes.
- *National and State Policies*: Certain Policies are in place that help promote participation in AP courses and encourage campuses to reach students of all ethnic backgrounds to enroll in advanced courses.
- *Student College Preparation Disparities*: Despite the increase in post-secondary enrollment, educational disparities still exist among African American, Hispanic, and low-income students (Engberg & Wolniak, 2010).

- *STEM*: Advanced preparation in math and science courses offers young students' exposure to academic rigor that will better prepare them for college courses and enhance their opportunities to succeed in STEM fields (Klopfenstein, 2014; Roach, 2018). With the increasing demand for Science, Technology, Engineering, and Math (STEM) careers, it is critical that the US grow its STEM workforce to maintain its role in global leadership
- *Indicators*: Previous research describes the role of teachers on the impact of students' enrollment, participation, and performance on AP classes (Mason, 2010). According to the College Board (2015), student indicators that determine how successful a student will be in AP courses is based on their performance on PSAT/NMSQT and SAT test. AP Potential helps identify students who are likely to succeed on AP exams (College Board, 2018). Previous research suggests there is a moderate to strong relationship between PSAT/NMSQT and AP scores (Zhang, Patel, & Ewing, 2014).). Other than the AP Potential, teachers do not have a set-based criterion that serves as indicators for students to enroll in AP courses. The College Board does offer a Conversation Starter that is a guide for teachers and counselors to use for students who are interested in AP classes (College Board, 2017). Essentially the only formal data teachers to promote AP enrollment is driven by student performance on PSAT/NMSQT and SAT test.

Format. Using the *Four Disciplines of Execution* (McChesney, Covey, & Huling, 2016), a Wildly Important Goal (WIG) will be aligned with the objectives of professional development. The WIG for the training is to improve student AP enrollment. The

training on AP indicators will be divided into three sessions: Session 1- AP Information, Session 2- Indicator Training, and Session 3-Evaluation. Teachers will rotate between 3 different sessions listed in Table 12 below.

Table 19

Session Objectives

Session 1: AP Information Why is AP Important?	**Session 2- Indicator Training** Implementing AP student indicators	**Session 3- Evaluation** A look ahead
• Every Student Succeeds Act (ESSA) • Texas HB5 • AP and Science, Technology, Engineering and Mathematics (STEM)	• Conversation Starters • Student Surveys • Parent AP Information Nights	• CBAM Model • 30-60-90- Plan

Delivery

Intended Audience. The intended audience for the AP Indicator Training will be current PAP and AP teachers. The participation of PAP teachers can expand their knowledge of College Board resources available for PAP students. AP teachers will benefit from the training by learning how to implement strategies geared to identify potential AP students.

Presentation Process. A PowerPoint presentation will be aligned with the objectives of each session. Each session will also include the application of meaningful engagement activities, implementation of the indicators using student and parents'

surveys, and training evaluation through the 30-60-90 Plan. Session 3 will incorporate the Concerns-Based Adoption Model (CBAM).

Session 1: Why is AP Important?

Begin with the WIG in mind. Using the powerpoint slides 3-15 will provide teachers previous research that supports the importance of AP enrollment and college readiness among minorities such as Hispanic students with the following information: Research suggests there are social, economic, and cultural factors that promote and discourage AP enrollment on Hispanic students across all academic levels (Witenko et al., 2016; Walker & Pearsall, 2012; Engberg & Wolniak, 2009; Klopfenstein, 2004). It is due to the impact of these factors that Hispanic students are considered to have unequal educational opportunities for advanced coursework (Ndura, Robinson, & Ochs, 2003). Examining these contributing factors and the conditions underlying Hispanic student's college readiness is requisite to advancing the role of Hispanic students in STEM education and, thereby, STEM careers. Addressing Hispanic educational disparities, such as underrepresentation in AP and STEM preparation, can improve education equity that is aligned with ESSA and HB5.

Activity 1: To provide meaningful adult engagement for professional development, a reflection activity will be assigned. AP teachers will be asked to reflect on the factors they feel students have in participating in AP enrollment. Each teacher will then share their list with another teacher from the group and compare common factors. Teachers with the most common factors will be asked to read them out loud. This activity will identify the differences in factors among AP teachers. Every campus has a

unique culture; the reflection activity provides a vision of differences among students and factors that affect AP enrollment.

In some cases, students participate in AP classes because their parents influence their decisions; on the other end, some students are not even aware of the availability of AP classes. Activity 1 will provide teachers from different campuses of insight into factors that promote AP enrollment through personal engagement**.** Merriam and Bierema (2014) discuss the connection between adult learning and experience. Experience is a resource that affects learning. In this case, teachers will be asked to reflect on their experiences of teaching to identify factors that affect student AP enrollmen**t.**

Session 2: AP Indicator Training The College Board provides teachers with resources to help promote AP participation using conversation starters. One of the activities in session two will have teachers engage in a conversation starter provided by the College Board (see appendix 1). Teachers will pair off and identify partner A and B. Partner A will be the teacher conducting the interview, and partner B will be the student answering the questions. The conversation starter is a great resource that teachers can use to identify potential AP students. Unfortunately, many teachers are not given access to the resource nor the proper training to conduct the interviews. The interview training will help teachers engage in conversations with other teachers before conducting student interviews.

Activity 3: Student Indicators. The third activity will ask teachers to gather in groups of 4. The activity will require participants to list three student indicators they use to promote AP enrollment. They cannot use the PSAT/NMSQT or SAT data. Teachers

will be asked to provide characteristics they identify in students indicate they will succeed in AP courses. Teachers will be asked to provide a list of online AP resources they currently use or have thought about using to promote AP enrollment. The indicator activity will open the floor for the WIG of the training.

Student Surveys: Student surveys can also serve as strong indicators to help improve the overall enrollment of students in AP courses. The student surveys are not limited to Hispanic students and can be used to promote AP enrollment for all students. Teachers should be provided adequate training on performance indicators through student surveys, teacher interviews, and PACT/SAT data. Using all three indicators can help promote AP enrollment of not just Hispanic students but all students that otherwise do not have the opportunity to enroll in AP courses.

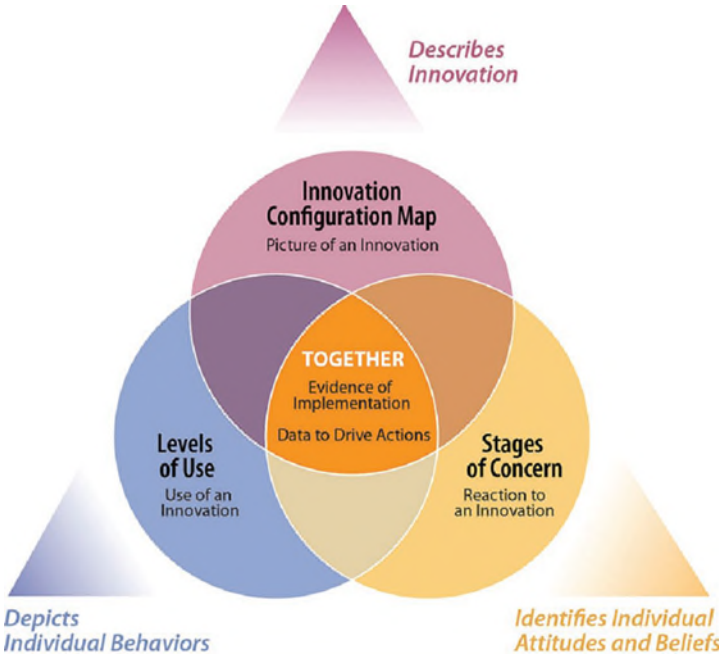
Parent Information Nights: Parents mostly influence students who enroll in AP classes. Ndura, Robinson, & Ochs (2003) reported that the greatest impact of student motivation for AP courses was based on parent influence. Session 2 of the training will provide teachers guidelines to hold parent information nights for potential AP students. The goal is to provide parents with information about the benefits of enrolling in AP courses.

Presentation Availability. The face-to-face presentation or AP Indicator training will be made available during the summer. PAP and AP teachers will be given professional development training hours for participating in the training. Teachers who do not attend the summer training will have opportunities to attend during the fall and spring.

Session 3. Evaluation/Assessment

The training evaluation will incorporate the use of two models. Teachers will receive training on the CBAM model and the 30-60-90 Plan. A formative assessment will be implemented using the CBAM model. The summative assessment will be using a 30-60-90 plan that will be used by teachers and administrators at each campus.

Figure 6. CBAM's three diagnostic dimensions.



This figure illustrates how the three diagnostic dimensions work together to drive improvement in implementing new initiatives. From the American Institutes for Research (AIR). (2018). *CBAM: The concerns-based adoption model*. Retrieved from https://www.air.org/resource/concerns-based-adoption-model-cbam.

Innovation configuration. The implementation of new methods requires step-by-step procedures that will make innovation effective. The first step in the implementation

process about CBAMs diagnostic dimensions is the Innovation Configuration Map. The map provides valuable strategies that administrators can utilize for innovative problem-solving. Mintrop (2016) describes the process necessary before the implementation of innovation by elaborating on the focus of user-centered activities. According to Mintrop (2016), user-centered activities allow for implementation to occur because of shared responsibilities. The collaborative efforts between administrators and staff increase the possibilities of successful outcomes (Mintrop, 2016; Brown & Olsen, 2015). The application of new strategies can be guided by the Innovation Configuration Map that will allow teachers and administrators to follow a designed plan. The designed plan of the Configuration map creates the opportunity to focus on staff efforts. Whitaker (2012) describes the characteristics of great principals include facilitating the implementation of innovations. Effective and great principals can improve the implementation of innovations guided by the Configuration Map to also evaluate the effectiveness of a program and identify areas for growth. Administrators can provide support through innovation configuration.

Stages of communication. The second diagnostic dimension gives administrators a clear perspective of staff beliefs, concerns, and attitudes through the evaluation of a questionnaire. Stages of concern are a process that includes a variety of tools necessary to increase administrators an understanding of staff needs. A clear understanding of staff needs improves areas for support. Gathering information on staff beliefs, attitudes, and concerns can be collected through interviews and surveys and are not limited to questionnaires. Stages of Communication will be incorporated for the formative

assessment of the AP Indicator Training. Teachers will complete the Stages of Concern Survey based on the Indicator Training. Data collected from the formative evaluation using Stages of Concern will provide the training facilitators with the necessary information to improve the training.

Stages of Concern	Typical Statement
0: Unconcerned	"I think I heard something about it, but I'm too busy right now with other priorities to be concerned about it."
1: Informational	"This seems interesting, and I would like to know more about it."
2: Personal	"I'm concerned about the changes I'll need to make in my routines."
3: Management	"I'm concerned about how much time it takes to get ready to teach with this new approach."
4: Consequence	"How will this new approach affect my students?"
5: Collaboration	"I'm looking forward to sharing some ideas about it with other teachers."
6: Refocusing	"I have some ideas about something that would work even better."

Table 20. The seven stages of concern in CBAM. From the American Institute for Research (AIR) *(2018). Stages of concern: Concerns-based adoption model.* Retrieved from https://www.air.org/resource/stages-concern.

Levels of use. The third diagnostic dimension helps determine how the program or innovation is being utilized. Levels of use help determine how a program is being implemented by each individual and as a collaborative team. The levels of use are perhaps one of the most important dimensions in the Configuration Model because it measures the outcome of the innovation. Levels of Use will be the formative evaluation tool that will include the 30-60-90 day plan.

Summative

The 30-60-90 day plan will provide administrators and teachers a focus to monitor the implementation of the new AP indicators. Using *The Four Disciplines of Execution* (McChesney, Covey, & Huling, 2012) to identify the objective and focus of professional development creates specific guidelines to reach the goal. The 30-day plan begins with student surveys created through Survey Monkey, and then analyzed the data from the surveys. The 60-day plan includes monthly teacher meetings to teach students highly effective AP tools. The 90-day plan includes all stakeholders' meetings to evaluate the innovation and identify areas of need.

Summary

The key objective of the Action Plan is to Improve Student AP Participation through the Implementation of Performance Indicators. Teachers will receive training on how to implement the performance indicator and conversation starters. The formative evaluation will provide training facilitators tools to improve the efficiency of the training. The summative evaluation will provide administrators resources to monitor the implementation of the indicator strategies. The summative evaluation will provide teachers guidelines and goals to implement the indicator strategies. The combination of adequate professional development and student knowledge of the positive outcomes can help improve AP student participation.

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Appendix A

Institutional Review Board

School District Approval

APPROVAL OF SUBMISSION

July 19, 2019

Cynthia Ramirez

cramirez36@uh.edu

Dear Cynthia Ramirez:

On July 19, 2019, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	Advanced Placement Participation Among Latino Students
Investigator:	Cynthia Ramirez
IRB ID:	STUDY00001755
Funding/ Proposed Funding:	Name: Unfunded, Grant Office ID: NA, Funding Source ID: NA
Award ID:	NA;
Award Title:	
IND, IDE, or HDE:	None
Documents Reviewed:	• Humble ISD Approval , Category: IRB Protocol; • Cynthia_Ramirez_Special_Pops_IRB.pdf, Category: IRB Protocol;
Review Category:	Exempt
Committee Name:	Not Applicable
IRB Coordinator:	Sandra Arntz

The IRB approved the study on July 19, 2019 ; recruitment and procedures detailed within the approved protocol may now be initiated.

As this study was approved under an exempt or expedited process, recently revised regulatory requirements do not require the submission of annual continuing review documentation. However, it is critical that the following submissions are made to the IRB to ensure continued compliance:

- Modifications to the protocol prior to initiating any changes (for example, the addition of study personnel, updated recruitment materials, change in study design, requests for additional subjects)
- Reportable New Information/Unanticipated Problems Involving Risks to Subjects or Others

- Study Closure

Unless a waiver has been granted by the IRB, use the stamped consent form approved by the IRB to document consent. The approved version may be downloaded from the documents tab.

In conducting this study, you are required to follow the requirements listed in the Investigator Manual (HRP-103), which can be found by navigating to the IRB Library within the IRB system.

Sincerely,

Research Integrity and Oversight (RIO) Office
University of Houston, Division of Research
713 743 9204
cphs@central.uh.edu
http://www.uh.edu/research/compliance/irb-cphs/

Accountability and Research
Humble ISD
Humble, Texas

June 18, 2019

Dear Cynthia Ramirez,

Thank you for your interest in conducting research in Humble ISD. I am happy to inform you that your proposal number 083118a, entitled "Advanced Placement Enrollment for Hispanic and ELL students" has been approved, which includes access to Advanced Placement data until June 1, 2020. You will be responsible for keeping all personally identifiable data secure per best practices, collecting and maintaining consent forms, and destroying any personally identifiable documentation by August 15, 2020 (for examples, see http://csrc.nist.gov/publications/nistpubs/800-122/sp800-122.pdf).

The proposed study should prove to be a useful contribution to improving Humble ISD, as well as a contribution to the practice of instruction.

As part of the research process, you will continue to consult with district staff and this office, as needed, and follow the guidelines of your institution's human subjects committee.

If you have any questions, please do not hesitate to contact me.

Best wishes,

Warren Roane, Ph.D.
Director of Accountability and Research
Humble ISD
281-641-8124
wroane@humbleisd.net